Syllogeus 69

The Lichens of Southern Ontario, Canada

Pak Yau Wong and Irwin M. Brodo

Canadian Museum of Nature

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Abstract

The lichen flora of southern Ontario as we now know it consists of 482 taxa (465 species, 5 subspecies and 12 varieties) in 131 genera. The flora is undoubtedly smaller now than it was 75 or 100 years ago due mainly to air pollution and habitat destruction. Frequency, habitat, substrate, and counties of occurrence are recorded for each taxon, as well as taxonomic comments for many. Keys to species of some genera are also included to supplement or update the keys presented in Brodo's "Lichens of the Ottawa Region, 2nd edition."

Résumé

La flore lichénique du Sud de l'Ontario est formée, dans l'état actuel de nos connaisances, de 482 taxons (soit 464 espèces, 6 sous-espèces et 12 variétés) regroupés en 130 genres. Cette flore est sans doute moins importants qu'elle ne l'était il y a 75 ou 100 ans, principalement en raison de la pollution atmosphérique et de la destruction de son habitat. Pour chacun des taxon, on a noté la fréquence, l'habitat, le substrat et le comté où se trouve et, dans de nombreux cas, des commentaires d'ordre taxonomique. On donne aussi des clefs d'identification pour les espèces de certains genres qui compléteront ou mettront à jour les clefs présentées dans l'ourvrage de I. Brodo, intitulé *Lichens of the Ottawa Region, 2nd edition*.

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We are grateful to Rupert Warren who assisted the senior author in the field in the Toronto area, and Peter Bowler who accompanied him to the Bruce Peninsula. The senior author especially thanks John Krug for giving him access to the lichen herbarium at the University of Toronto (TRTC). Erich Haber generously assisted with computer mapping of *Bryoria furcellata* and *Pyxine sorediata*. We are very grateful to the following individuals for recommending many excellent collecting sites: Albert Dugal, John Krug, Rupert Warren, and Shiela and Harry Thomson.

Introduction

Southern Ontario is one of the most densely populated areas in Canada and includes some of the most heavily industrialized cities in Canada (e.g., Toronto, Windsor and Hamilton) as well as other population centres (e.g., Ottawa, the capital of the country). As a result of extensive cultivation, settlement and industrialization, southern Ontario has lost most of its original habitats, especially in the regions south of Simcoe and Grey counties and west of Peel and York counties, and thus, the number of lichens has declined dramatically over the past 75-100 years. In comparing Macoun's collections of about a century ago with those we can make today, the drastic decline in number and diversity of taxa is evident (see discussion below). The reason for the decline is due to a combination of deterioration of air quality (lichens are notoriously sensitive to SO_2 pollution and the acid rain that comes with it), change in microclimate with changes in land use, and actual habitat reduction.

It therefore was clear that if any record of the lichen flora was to be assembled, it would have to be done immediately, before a further reduction of the lichen population occurred, and with it, our understanding of the phytogeographic relationships between, for example, New York and New England to the east, and the Great Lakes region to the west. This list is an attempt to document the status of the flora at this point in time, against which, future changes can be assessed.

The most comprehensive work dealing at least in part with the lichens of southern Ontario (Brodo 1988) treats 400 species from the Ottawa region, 277 of which occur on the Ontario side of the Ottawa River. Other than that, and our recent paper on significant records from the area (Wong and Brodo 1990), very little has been done on the flora in recent years. (The history of lichen collecting in southern Ontario was reviewed by Wong and Brodo [1973].)

Field work was carried out mostly by the senior author, over the past 20 years, resulting in the collection of about 3900 specimens. Another 1800 specimens deposited in either the National Herbarium of Canada (CANL) or the University of Toronto (TRTC) were also examined and verified by the senior author. These include 680 collected by the junior author, with the remainder mainly collected by J. Macoun and R. F. Cain.

Description of the Area

For the purposes of this study, southern Ontario is defined as the area lying to the south of Algonquin Park and the major part of the Canadian Shield, and includes the southwestern peninsular area bounded by the Great Lakes together with the lowland between the Ottawa and St. Lawrence Rivers. It is therefore mostly the agriculturally developed portion of the province. Thirty six counties are included in the study area (see Fig. 1).

The following geological descriptions are based on Tovell (1964). Southern Ontario is, to a large degree, a glaciated plain underlain by Palaeozoic shales, strata of sandstone and carbonate rocks (limestones and dolomites). These rocks contain abundant fossils, the petrified remains of marine life that thrived in Palaeozoic ancient seas. The sedimentary rocks, therefore, originated as sand and mud on these sea floors; the rocks are between 530 and 310 million years old. Owing to the influence of favourable climate plus broadleaved vegetation and underlying calcareous bedrock, very fertile soils of the grey brown luvisols and humic gleysols have developed over the bedrock. The limestone boundary is not strictly the boundary of our "Southern Ontario", however, because certain areas are

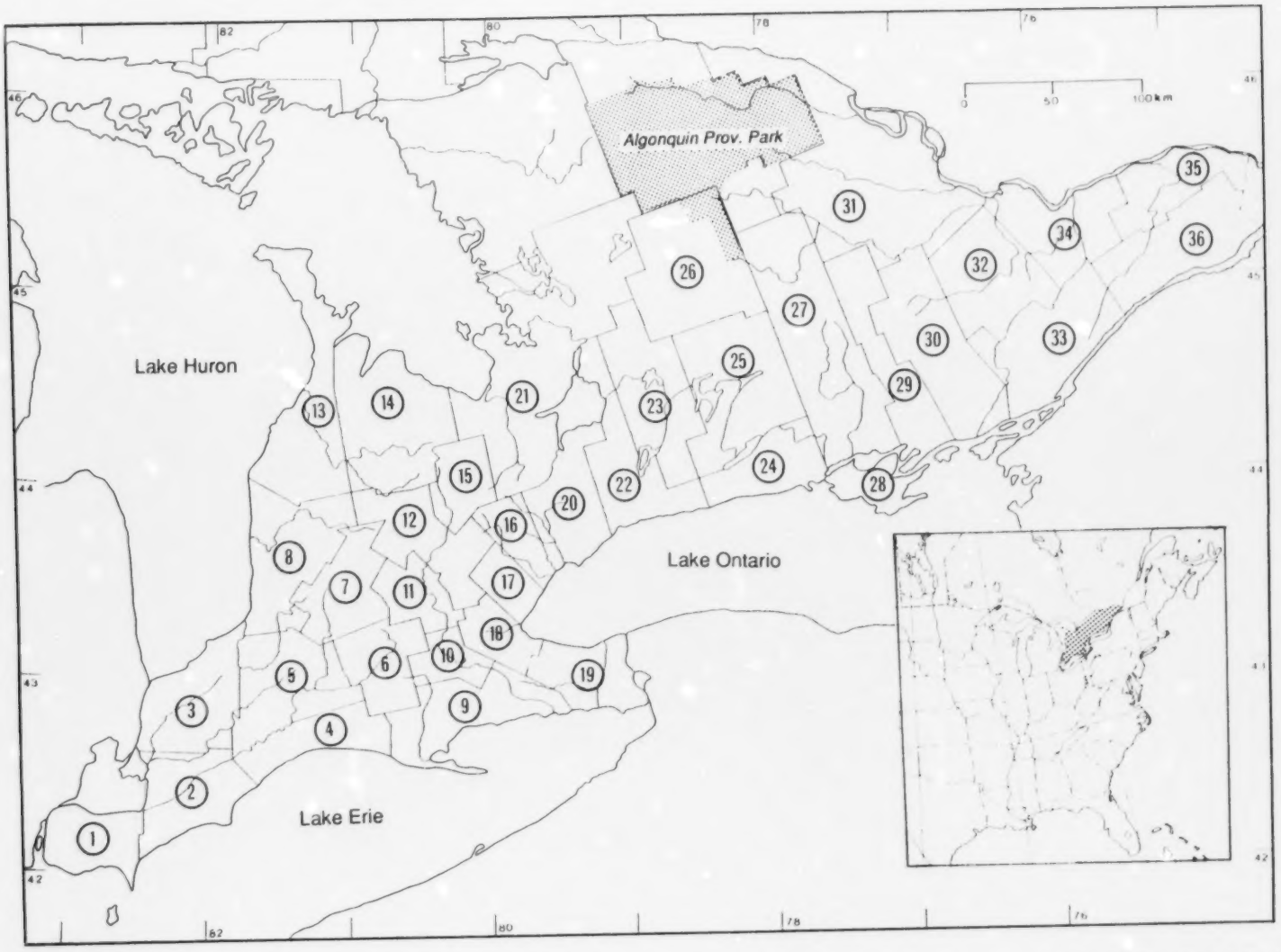

Figure 1. Map of southern Ontario showing the 36 counties included in the study (see text). Shaded area is Algonquin Provincial Park, just north of study area. Insert shows southern Ontario (stippled) in relation to eastern North America.

underlain by Precambrian rock. They are mainly granites, gneisses, and schists, but marbles and rocks of volcanic origin occur as well. These rocks are of metamorphic origin. The Precambrian rocks of southern Ontario are between 2,500 million and 800 million years old. These areas are mainly found in Frontenac, Leeds-and-Grenville, Renfrew, Lennox-Addington, Hastings and Haliburton counties, and also contain deep clay deposits. Probably all of southern Ontario, however, was covered at one time with Palaeozoic sedimentary rocks. These deposits were removed by erosion, exposing the rock of the Precambrian shield.

Southern Ontario is an area of modest relief. The lowest land along the Ottawa River is only 50 m above sea-level, whereas the highest point, on Blue Mountain south of Collingwood, barely reaches 600 m above sea-level.

The climate of most of the region places it into either the "Humid High Moderate Temperate Ecoclimatic Region (HMTh)" close to Lake Erie, or the "Humid Mid-Cool Temperate Ecoclimatic Region (MCTh)" to the north (Fig. 2; Ecoregions Working Group 1989). In both regions, summers and warm to hot and winters are mild, with precipitation occurring rather uniformly throughout the year (averaging 800-960 mm per year). Lake Erie exerts a moderating influence on the HMTh area with winter temperatures never getting as low as they do to the north and with temperature fluctuations being less severe. At the northern edge of the region in Haliburton, Renfrew and northern Hastings Counties, the climate is slightly more continental (in the "Humid High Cool Temperate Ecoclimatic Region [HCTh]"), with the winters becoming cold and snowy, but with most precipitation occurring in summer (Fig. 2).

Snowfall ranges from an average of 1000 mm at the shore of Lake Erie to 2800 mm in Bruce and Grey counties (Anonymous 1957). Most snow falls during several storms, but the snow may melt completely in any winter month near the Lakes (Wong and Brodo 1973).

The following brief account of the vascular plant vegetation of the area is derived mainly from Falls and Soper (1964) and Scoggan (1966).

The main pattern of natural vegetation of southern Ontario consists of broad belts of forest running in an east-west direction. The Deciduous Forest Region occupies a comparatively small area north of Lake Erie between the southern end of Lake Huron and the western end of Lake Ontario. The dominant trees of this region are: *Acer saccharum, Tilia americana, Fagus grandifolia, Fraxinus americana, Quercus rubra, Q. alba, Prunus serotina, Ostrya virginiana, Acer rubrum, Carpinus caroliniana, Ulmus americana, Carya ovata* and *Juglans cinerea*. Some southern species are also found here, such as *Juglans nigra, Sassafras albidum, Pyrus coronaria, Quercus bicolor, Cornus florida* and *Nyssa sylvatica*. The Deciduous Forest is, of course, composed mainly of deciduous trees, but some conifers are also there, notably *Pinus strobus, Thuja occidentalis, Juniperus virginiana* and *Tsuga canadensis. Picea mariana* and *Larix laricina* are restricted to isolated bogs or cool wet woods. Some shrubs in this region are *Hamamelis virginiana, Lindera benzoin, Staphylea trifolia, Corylus americana, Direa palustris, Euonymus atropurpureus, Ribes americanum, R. cynosbati, Symphoricarpos albus, Viburnum acerifolium, Prunus virginiana* and *Rhus radicans* var. *rydbergii*.

The bulk of the study area is occupied by "Mixed Forest", the eastern section of the Great Lakes - St. Lawrence Forest Region of Rowe (1959). The common deciduous species include such northern hardwoods as *Populus tremuloides, P. balsamifera, Betula papyrifera, and B. alleghaniensis*, as well as other species common to the Deciduous Forest Region, namely: *Acer saccharum, A. rubrum, Quercus rubra, Ostrya virginiana, Ulmus americana, Fagus grandifolia, Tilia americana* and *Prunus serotina. Juglans cinerea* is restricted to limestone and other basic soils south of the Canadian Shield. The common conifers are *Pinus strobus, Thuja occidentalis, Picea glauca, Abies balsamea* and *Tsuga canadensis. Picea mariana* and *Larix laricina* are common in poorly drained situations, often forming dense stands. *Pinus rigida* is confined to rocky ridges (quartz) in Leeds-and-Addington

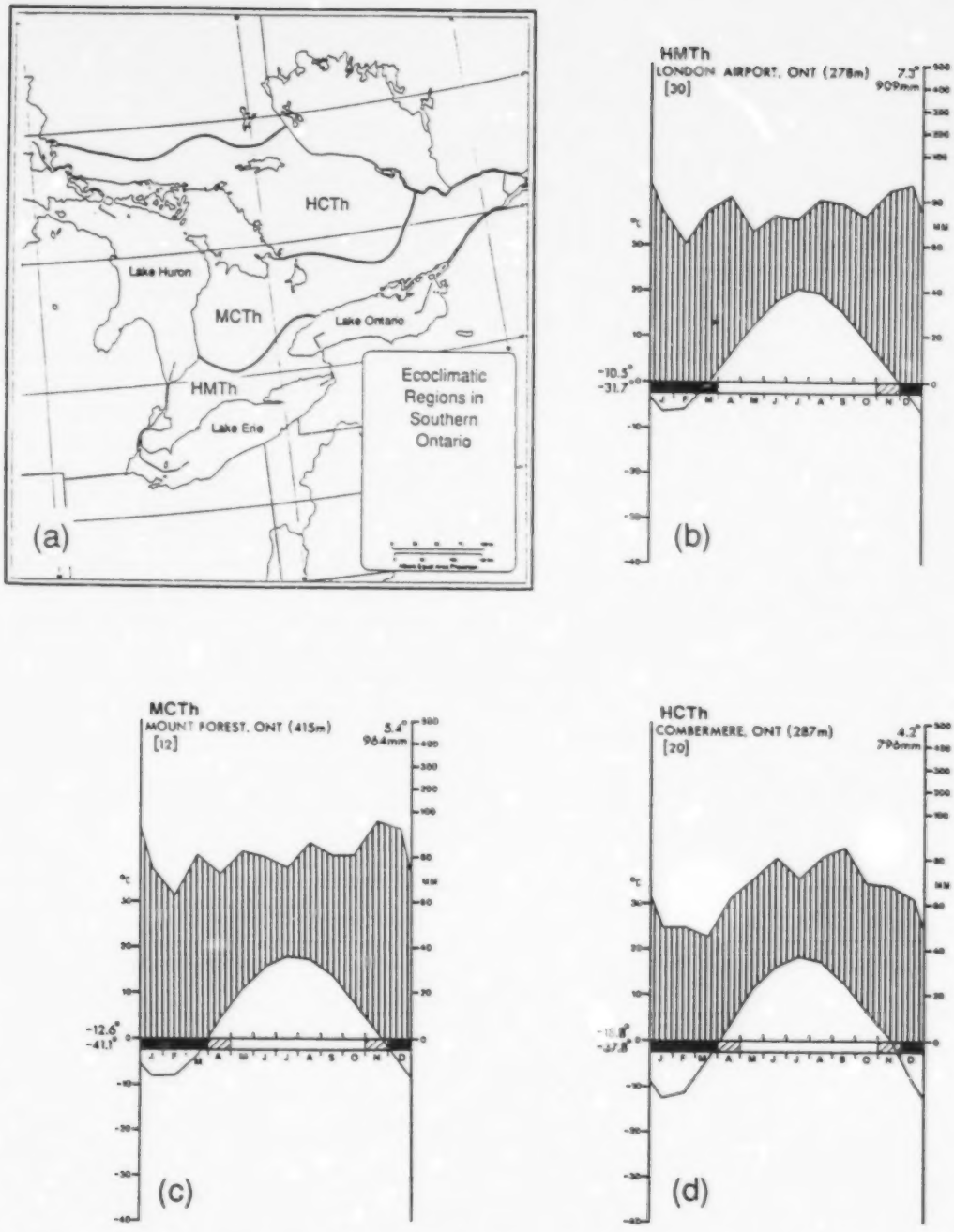

Figure 2. Climate and Ecoclimatic regions of southern Ontario (Ecoregions Working Group 1989). (a) Ecoclimatic categories (see text); (b-d) climate diagrams: top curve, average monthly precipitation (mm); lower curve: average monthly temperature (°C.); vertically shaded area: period of relatively humid climate; upper right-hand corner: average annual temperature and precipitation; (b) HMTh (Humid High Moderate Temperate); (c) MCTh (Humid Mid-Cool Temperate); (d) HCTh (Humid High Cool Temperate).

County. Common shrubs of the Mixed Forest are *Corylus cornuta, Lonicera canadensis, Dieruilla lonicera, Sambucus pubens, Acer spicatum, Alnus rugosa, Cornus rugosa, Ribes glandulosum and Crataegus* spp.

Lichens of Particular Habitats

As a result of extensive disturbance by man, the southern section of the area, south of Huron to York Counties, has few original habitats. Roadside trees, fence posts, exposed outcrops and open fields are almost the only lichen habitats found in these areas, although some important parks exist especially along the lake shore. The central parts of the area, mainly along the Frontenac Axis, and all of the northern sections including Bruce County, and especially Simcoe, Haliburton and Renfrew Counties, contain a diversified and rich lichen flora. The diverse floristic, geological and topographic features in that area have created an intricate pattern of lichen vegetation.

Saxicolous species

Saxicolous species form one of richest lichen communities in southern Ontario. Crustose species are more numerous than foliose species, and fruticose lichens other than those in such genera as *Cladina, Cladonia* and *Stereocaulon* are very few.

The wet limestone rocks along streams or shorelines bear *Verrucaria funckii, V. aethiobola* and *Collema fuscovirens. Staurothele fissa* usually forms a black zone on granitic boulders or outcrops at water level along lake shores, and the semi-aquatic lichen, *Dermatocarpon luridum*, is not uncommon in the region.

A number of species are found only on calcareous rocks in the forest or shaded situations. These include *Acarospora cervina* var. *glaucocarpa, Caloplaca citrina, Collema bachmanianum* var. *bachmanianum*, and *Endocarpon pusillum*. Dry calcareous rocks on rocky shores may sometimes support *Caloplaca cirrochroa*. Exposed calcareous rocks, including concrete serve as substrate for some of the crustose lichens, such as *Aspicilia contorta, Caloplaca feracissima, Lecanora dispersa, Sarcogyne regularis, Thelidium decipiens, Verrucaria calkinsiana*, and *V. muralis*. Many species are found either on calcareous or granitic rocks. These include *Caloplaca flavovirescens, Dermatocarpon miniatum, Lecanora muralis, Lepraria* spp., *Leptogium cyanescens, Nephroma parile, Pannaria leucophaea, Phaeophyscia sciastra, Physcia caesia, Verrucaria fuscella, V. glaucovirens, V. nigrescens*, and *V. nigrescentoidea*.

Many species of *Cladina* and *Cladonia* are very common in crevaces in which a small amount of plant litter has accumulated or mosses have grown.

The lichen vegetation on hardrock (i.e., granite and other siliceous rocks) restricted to forests or cliffs is relatively poor. These lichens include *Aspicilia cinerea* var. *laevata, Cetraria oakesiana, Collema subflaccidum, Diploschistes scruposus, Flavoparmelia baltimorensis, Physcia phaea, Porpidia albocaerulescens, Rhizocarpon obscuratum, Trapelia placodioides, and Umbilicaria mammulata*.

Exposed hardrock boulders or cliffs are covered by a large number of common species not found on other substrates. These include *Dimelaena oreina, Diploschistes scruposus, Lasallia papulosa, Lecanora polytropa, Lecidea delincta, Melanelia disjuncta, M. sorediata, Micarea erratica,*

Polysporina simplex, Rhizocarpon grande, Rhizoplaca chrysoleuca, Stereocaulon saxatile, Umbilicaria deusta, U. muehlenbergii, Xanthoparmelia conspersa, X. plittii and *X. somloënsis*.

Corticolous species

Roadside trees, especially those having bark with a relatively high pH such as elms, poplars, and some maples, bear an abundant growth of some common lichens, such as *Buellia punctata, Caloplaca microphyllina, C. cerina, C. holocarpa, Candelaria concolor, Cladonia coniocraea, Flavoparmelia caperata, Parmelia sulcata, Physcia aipolia, P. adscendens, P. millegrana, Physconia detersa, Scoliciosporum chlorococcum, Xanthoria fallax*, and *X. polycarpa*. The luxuriance and abundance of these appear to be based on their toxitolerance. Most of these lichens also grow on rocks or fence posts.

Cedar swamps are mainly found in the northern part of the area, but are scattered in the eastern sector as well. Corticolous species frequently found in such swamps on the *Thuja, Fraxinus* or *Ulmus* include *Bacidia carneoalbida, B. polychroa, B. schweinitzii, Cladonia squamosa, Loxospora ochrophaea, Mycobilimbia berengeriana, Mycocalicium subtile, Ochrolechia arborea, Pertusaria amara* and *Punctelia rudecta*. A few other lichens are characteristic of coniferous trees (*Picea, Abies*, or *Pinus*) such as *Bryoria, Catillaria nigroclavata, Cetraria ciliaris, Lecanora pallida* var. *rubescens, L. wisconsinensis, Ochrolechia androgyna*, and *Parmeliopsis ambigua*.

Hardwood trees with a more acidic bark such as *Acer saccharum, Quercus rubra, Q. velutina*, and *Tilia americana* are common in southern Ontario and they have a rich epiphytic flora quite distinct from that of poplars and elms, or conifers. Species characteristically found on such hardwood trees include: *Arthonia radiata, Bacidia naegelii, Eopyrenula leucoplaca, Flavoparmelia caperata, Lecanora glabrata, L. hybocarpa, Melanelia subaurifera, Parmelina aurulenta, P. galbina, Phaeophyscia pusilloides, Pyrrhospora varians*, and *Rinodina subminuta*.

A few common species can live on either tree bark or rocks, these include: *Buellia punctata, Candelaria concolor, Cetrelia olivetorum, Lecanora thysanophora, Micarea peliocarpa, Parmelia sulcata, Phaeophyscia rubropulchra, Physcia dubia, Physconia detersa, Punctelia rudecta, and Ramalina intermedia*.

Terricolous species

Terricolous lichens, as designated here, are those that grow on humus, soil, mosses or plant litter. In southern Ontario, terricolous lichens are usually found in open fields, forest glades or on mosses over wood, rocks or trees. Such habitats contain: *Baeomyces fungoides , Catapyrenium lachneum, Cetraria arenaria, Cladina arbuscula, C. mitis, C. rangiferina, C. stellaris, Cladonia acuminata, C. bacillaris, C. caespiticia, C. cariosa, C. cervicornis* ssp. *verticillata, C. chlorophaea, C. coniocraea, C. cornuta, C. crispata, C. cristatella, C. cryptochlorophaea, C. cylindrica, C. dahliana, C. decorticata, C. deformis, C. digitata, C. fimbriata, C. furcata, C. gracilis* ssp. *turbinata, C. grayi, C. humilis, C. macilenta, C. magyarica, C. multiformis, C. peziziformis, C. phyllophora, C. pleurota, C. pocillum, C. pyxidata, C. rei, C. squamosa, C. turgida, C. uncialis, Collema bachmanianum* var. *bachmanianum, C. tenax, Diploschistes scruposus, Lecidea berengerana, Lepraria finkii, Leptogium lichenoides, Mycobilimbia sabuletorum, M. tetramera*, and *Placynthiella uliginosa*.

Lignicolous species

The lignicolous species are those that grow on wood, including fence posts, stumps, logs and dead trees. A few species show an affinity for charred wood, such as *Biatora botryosa, Hypocenomyce anthracophila, H. friesii, H. scalaris, Trapeliopsis flexuosa* and *T. granulosa*.

Most species characteristically found on wood often also occur on other substrates, especially conifer bark. These species include *Bacidia carneoalbida, Bryoria furcellata, Caloplaca ferruginea, C. holocarpa, C. microphyllina, Candelariella xanthostigma, Cetraria ciliaris* var. *ciliaris, C. ciliaris* var. *halei, C. oakesiana, C. pinastri, Cyphelium tigillare, Imshaugia aleurites, Lecanora impudens, L. piniperda*, and *L. pulicaris*.

The Present Lichen Flora

The lichen flora of southern Ontario, as presently known, consists of 482 taxa (465 species, 5 subspecies, and 12 varieties) in 131 genera. The flora of Ontario as a whole has approximately 830 recorded species, although this number is certainly an underestimate of the actual lichen flora (Brodo, unpublished). Since most of southern Ontario is dominated by deciduous forest, it is not surprising that the greater part of its flora is related to the Eastern Temperate or Appalachian-Great Lakes distribution types. The flora relates to other parts of Canada and the United States to varying degrees, and this is summarized in Table 1. Here, the floras of Fundy National Park, New Brunswick, (including Charlotte County) (Gowan and Brodo 1988); the Straits region of Michigan (Harris 1977); the Ottawa region (Brodo 1988); and the state of Missouri (Ladd and Wilhelm, unpublished) are compared using Jaccard's coefficient of similarity (Dunn and Everitt 1982): a/a+b+c, where a = the number of species present in both regions 1 and 2, b = the number of species in region 1 and absent from region 2, and c = the number of species in region 2 and absent from region 1.

Table 1. Lichen flora of southern Ontario compared with floras of other areas in North America.

Region	Av. Distance (kilometres)	No. species (total)	No. species in common	Jaccard's coefficient
Ottawa Region (Brodo 1988)	375	400	370	.7226
Straits area, Michigan (Harris 1977)	600	430	365	.6673
Fundy National Park (Gowan & Brodo, 1988)	1050	509	266	.3669
Missouri (Ladd & Wilhelm, unpubl.)	1350	437	215	.3153

Although the coefficient of any given region is closely related to its average distance from southern Ontario, there is clearly a much greater degree of similarity between the floras of our region

Table 2. Lichens that may no longer be part of the southern Ontario lichen flora, based on species lists compiled from records from 1930 or earlier, and records from 1960 or earlier (minus those in the pre-1930 list.

Lichens not collected since 1930

Species	*Distribution type*
Anzia colpodes (Ach.) Stizenb.	Appalachian-Great Lakes region (southern)
Arthonia patellulata Nyl.	Boreal
Arthonia punctiformis Ach.	
Biatora helvola (Körber) Hellbom	S. Boreal to N. Temperate; B.C.?
Bryoria trichodes (Michx.) Brodo & D. Hawksw. subsp. *trichodes*	Great Lakes region (suboceanic)
Candelaria fibrosa (Fr.) Müll. Arg.	East Temperate
Collema nigrescens (Hudson) DC.	East Temperate,W
Evernia prunastri (L.) Ach.	Western; Great Lakes region
Heterodermia hypoleuca (Mühl.) Trev.	East Temperate
Heterodermia obscurata (Nyl.) Trev.	Southern East Temperate, Southwestern
Icmadophila ericetorum (L.) Zahlbr.	Boreal
Lecanora cfr. *caesiosora* Poelt	
Lecanora cenisia Ach.	Widespread
Lecanora imshaugii Brodo	East Temperate
Lecanora rupicola (L.) Zahlbr.	N. Boreal to arctic; west
Lempholemma myriococcum (Ach.) Th. Fr.	
Leptogium azureum (Sw.) Mont.	Southeastern Coastal Plain
Leptogium corticola (Taylor) Tuck.	East Temperate
Leptogium crenatellum (Nyl.) Tuck.	East Temperate
Leptogium hirsutum Sierk	East Temperate, Western
Leptogium tenuissimum (Wallr.) Arn.	Widespread
Megaspora verrucosa (Ach.) Haffelner & V. Wirth	Boreal-A
Melanelia septentrionalis (Lynge) Essl.	Southern Boreal
Nephroma resupinatum (L.) Ach.	Southern Boreal, Northwest
Parmotrema margaritatum (Hue) Hale	Rare, East Temperate
Pertusaria rhexostoma Nyl.	Rare, East Temperate
Phaeocalicium polyporaeum (Nyl.) Tibell	
Physcia americana Merr.	East Temperate
Physcia tenella (Scop.) DC. in Lam & DC.	West and east coasts
Physconia distorta (With.) Laund.	Western
Plagiocarpa macrospora R. Harris	Rare; E. Temperate?
Plagiocarpa phaeospora R. Harris	East Temperate
Plagiocarpa septemseptata R. Harris	East Temperate
Pyrenula laevigata (Per.) Arn.	East Temperate; Mich. to N.Y.
Pyrenula subelliptica (Tuck. in Lea) R. Harris	NE Temperate (Appalach.?)
Pyrrospora varians (Ach.) R. Harris	East Temperate & B.C.
Rinodina polyspora Th. Fr.	
Sterocaulon dactylophyllum Flörke	Appalachian-Great Lakes
Strigula jamesii (Swinscow) R. Harris	
Teloschistes chrysophthalmus (L.) Th. Fr.	Prairies
Trypethelium virens Tuck. ex Michen. in Darl.	East Temperate

(Table 2, continued)

Lichens collected between 1930 and 1960, but not recollected since 1960

Species	*Distribution type*
Arthothelium spectabile (Flot. ex Fr.) Mass.	
Cetraria aurescens Tuck.	Appalachian-Great Lakes
Chaenotheca furfuracea (L.) Tibell	
Lecania dubitans (Nyl.) A.L. Sm.	
Lecidea chalybeiza Nyl.	
Leptogium byssinum (Hoffm.) Zw. ex Nyl.	
Nephroma bellum (Spreng.) Tuck.	App-GL-S. Rockies-west coast
Peltigera neopolydactyla (Gyeln.) Gyeln.	Boreal, coast to coast
Pyrenula macounii R. Harris	S. Ontario & N. New York
Usnea filipendula Stirton	

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with northern Michigan than with Fundy Park. Both have important boreal components, but the Fundy flora lacks many of the more continental species (Gowan and Brodo 1988). The representation of northern (boreal) species in southern Ontario comes mainly from the relatively few coniferous forest stands in Haliburton and Renfrew Counties, and some unusually rich *Thuja* stands elsewhere in the region. In the Ottawa area, for example, it is these cedar woods that harbour most of the northern Great Lakes disjuncts. Missouri does not have an important boreal element since it lacks a coniferous forest (other than pine-oak glades). The Ottawa flora is, of course, most similar to the flora of southern Ontario since it is in fact part of that flora. The boreal element in the Ottawa region is mainly found in the Quebec sector.

Changes in the lichen flora

In order to gain some appreciation of the extent of change in the lichen flora over the last 100 years, an analysis was made of the lichens known at three critical points in time: 1930, 1960, and the present. The lists in Table 2 were compiled from an analysis of the *CURATOR* database of lichen specimen data at the Canadian Museum of Nature. The aim of the analysis was to reveal which lichens have not been collected in recent years. The theory is that with the intense level of collecting by Wong and Brodo (1960-present) and by Roy Cain and colleagues (1930-1960), as assessment of the disappearance of lichens from the lichen flora can be made simply by comparing the list of lichens prior to 1930 (A), the list at 1960 (B), and the list at the present time (C). Lichens on list (A) but not on lists (B) or (C) (42 species, 9%) may have been extirpated and may be among the most sensitive to habitat destruction and other environmental modifications. Those on list (B) but not on list (C) (and with the species on list A removed), constitute an additional 10 species or 2%, and also may have disappeared, but perhaps are slightly less sensitive (and took longer to be eliminated from the southern Ontario flora).

Many if not most of the crustose lichens in the pre-1930 list are small and inconspicuous, and may not have been recollected since 1930 simply because they were overlooked. The foliose and fruticose lichens, however, are larger and probably represent species that have indeed disappeared from the flora over the last 60 years.

In analyzing the known distribution of these macrolichens and some of the better known crustose species, we can see that many of them represent more southerly species that were probably never very abundant in southern Ontario, e.g., *Anzia colpodes*, *Candelaria fibrosa*, *Lecanora imshaugii*, *Leptogium azureum*, *L. corticola*, *Parmotrema margaritatum*, *Pertusaria rhexostoma*, *Physcia americana* and *Trypethelium virens*. Most of the species from the Great Lakes region (which includes virtually all of southern Ontario) and southern boreal forest are lichens that do best in rich, undisturbed forests today, e.g., *Evernia prunastri*, *Melanelia septentrionalis*, *Icmadophila ericetorum*, *Nephroma resupinatum*, *N. bellum* and *Stereocaulon dactylophyllum*. *Menegazzia terebrata* was found by John Macoun on several occasions in the Ottawa area, but has not been seen in recent time in the same area. It is rare in the Quebec portion of the Ottawa region (Brodo 1988). Still others are clearly on the edge of their range, e.g., the prairie species, *Teloschistes chrysophthalmus*; and the arctic-alpine-western species, *Lecanora rupicola*. Other rare lichens such as *Cladonia pocillum*, *C. subulata*, *Megaspora verrucosa*, *Stereocaulon paschale* and *Usnea filipendula*, have a few post-1960 records, and are arctic-alpine or boreal species.

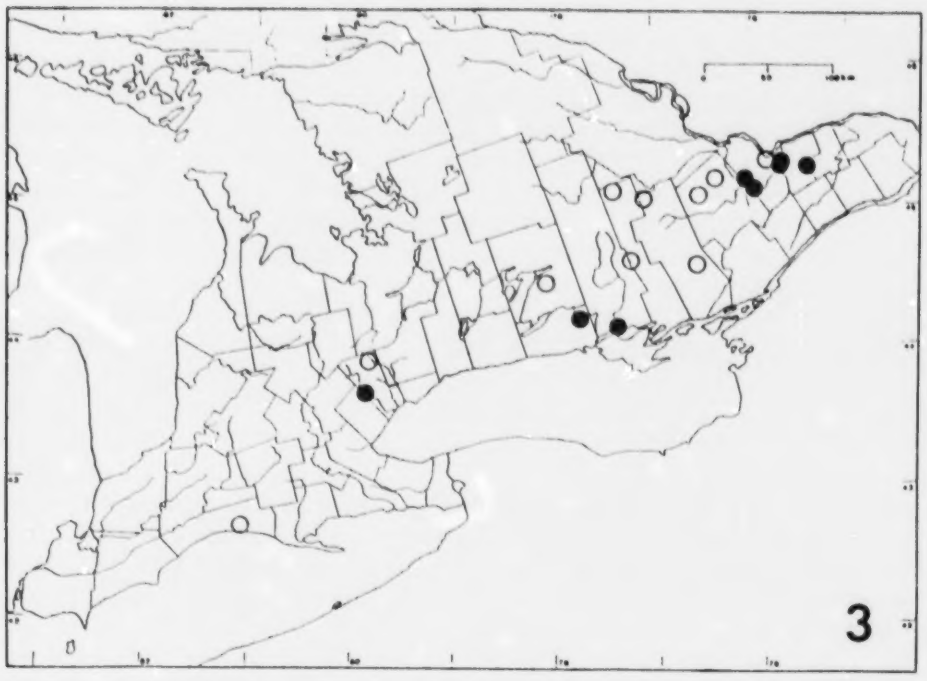
Thus, in most cases, it would seem that the disappearance of these lichens was due to a removal of their habitat, i.e., the old forests, and a resultant drying of the general environment by opening the land to farming. What is harder to assess is the number of lichens that have disappeared due to air pollution. That lichens are extremely sensitive to sulphur dioxide, heavy metal, and nitrous oxide pollution has been well-documented. Most sensitive are the arboreal macrolichens such as *Bryoria*, *Parmotrema*, and *Usnea*. It is therefore not surprising that species of these genera are rare or no longer found in southern Ontario, subjected as they are to pollution-laden air from the nickel belt and industrial region just up-wind to the west. The present and past distributions of *Pyxine sorediata* and *Bryoria furcellata*, for example, (Figs. 3,4) reveal the disappearance of this forest species from the Ottawa region, with the remants in the forested parts of Hastings, Lennox & Addington, Simcoe, Frontenac, Renfrew, Lanark and Peterborough counties. Although probably due to air pollution, the shrinkage in the range may also be due to a cutting of the old forests.

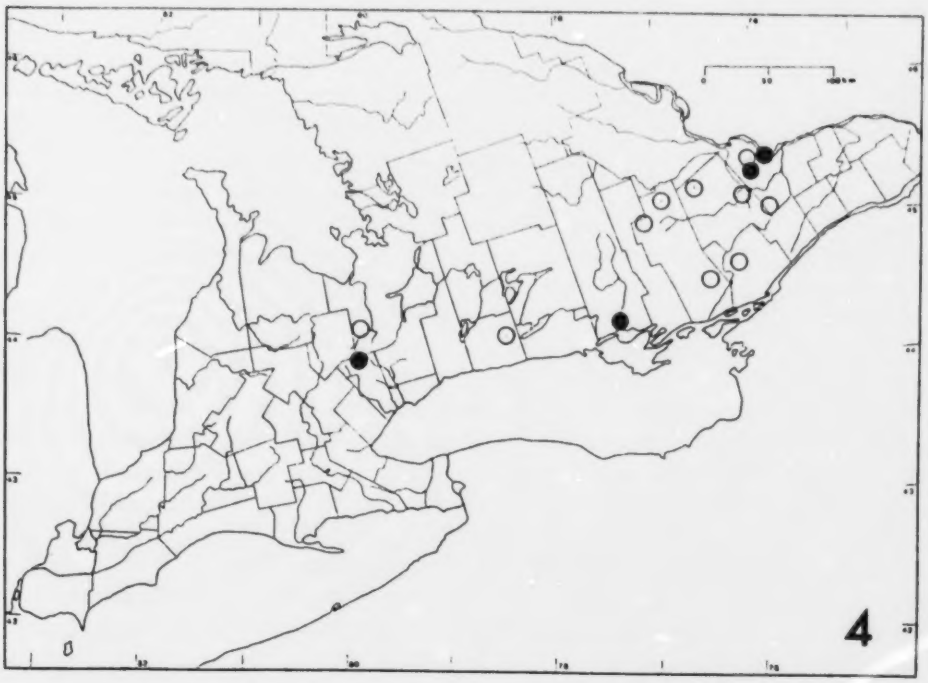
Other Uncommon Species

Ochrolechia pseudopallescens is one of the most common and widespread *Ochrolechiae* in eastern North America (Brodo 1991), but it is rare in southern Ontario. It may have disappeared with the cutting of the pine forests in the 1800's, since it is strictly a conifer bark and lignum species. It apparently reaches its northern limit here.

Phaeophyscia orbicularis is a western and central North America species (Esslinger 1977b). In southern Ontario, it is frequently found on tree barks, fence posts, or rocks. The occurrence of such a western species in southern Ontario is most unusual. It has a parallel with *Evernia prunastri*, a lichen with no modern records.

Three tiny, inconspicuous lichens were recently discovered in the region: *Strangospora pinicola* on the bark of a *Populus*, *Rinodina efflorescens* on deciduous trees, and *Caloplaca velana* on calcareous rocks. Because of their size, these species may have been overlooked in the past. These





Figures 3-4. Distribution of lichens in southern Ontario. 3. *Pyxine sorediata* 4. *Bryoria furcellata*
● Collections made before 1930; ○ Collections made after 1930.

European species have recently been reported as new to North America (Wong and Brodo 1990). Similarly, the European species, *Rinodina degeliana* was recently found together with *Rinodina efflorescens* on maple trees. They are new records for North America.

Other rare, recent discoveries for Canada include *Arthonia byssacea, A. diffusella, Bacidia circumspecta, Biatora epixanthoides, Cryptolechia carneolutea, Gyalecta truncigena, Parmotrema margaritatum, P. subtinctorium, Phaeophyscia hirsuta, Rinodina efflorescens,* and *Thelocarpon superellum* (Wong and Brodo 1990). Most of these species are good indicators of old forests. All but the *Parmotremae* are small and are easily overlooked in the field. They may well be more widespread in North America. Another rare crustose species, *Pachyphiale fagicola*, was found on a red maple tree, and is reported here as new to Canada.

List of Species

In this paper the species have been placed in alphabetical order. Nomenclature and authority abbreviations for the epithets mainly follow Egan (1987). Under each species, comments on relative frequency, substrate, ecology (if known), and locality (county) are presented. Notes on frequency are quasi-quantitative and refer to the number of counties in which the taxon was collected: "very rare": one county; "rare": two or three; "infrequent": four or five; "frequent": six to eight; "common": 9 to 15; "very common": over 15. Comments on taxonomy and notes on similar species are offered where appropriate. Taxa with an asterisk (*) to the left were recently reported as new to North America, Canada or Ontario (Wong and Brodo 1990), in most cases, with some discussion.

The number (1 to 36) in parentheses represents the county in southern Ontario from which the specimen is reported: (1) Essex, (2) Kent, (3) Lambton, (4) Elgin, (5) Middlesex, (6) Oxford, (7) Perth, (8) Huron, (9) Haldiman-Norfolk, (10) Brant, (11) Waterloo, (12) Wellington, (13) Bruce, (14) Grey, (15) Dufferin, (16) Peel, (17) Halton, (18) Hamilton-Wentworth, (19) Niagara, (20) York, (21) Simcoe, (22) Durham, (23) Victoria, (24) Northumberland, (25) Peterborough, (26) Haliburton, (27) Hastings, (28) Prince Edward, (29) Lennox-&-Addington, (30) Frontenac, (31) Renfrew, (32) Lanark, (33) Leeds-&-Grenville, (34) Ottawa-Carleton, (35) Russell, (36) Stormont-Dundas-&-Glengarry. These numbers are in accending order from Essex County in the west to Russell County in the east (see Fig. 1). To conserve space, collectors and/or collection numbers are only given for the uncommon lichens. For common lichens, we mention only the number of counties in which specimens were collected. Collector and collection numbers are listed for specimens collected by anyone other than the senior author. Those numbers without collector's names preceding them are the senior author's collection numbers. All the specimens are in the National Herbarium of Canada (CANL), unless otherwise indicated.

Most species in the southern Ontario lichen flora can be identified using the keys in Brodo (1988) for the Ottawa region. We are providing new keys here only for genera having a significant number of species not covered in that book. Keys were therefore written for *Bacidia* and similar genera, the *Caliciales, Caloplaca, Lecidea* s.lato, *Leptogium, Porpidia* and *Rhizocarpon*.

The complete set of specimen data is available at a nominal charge from the Botany Division of the Canadian Museum of Nature.

***Acarospora badiofusca* (Nyl.) Th. Fr.**

Rare; on calcareous and non-calcareous rocks, in the open. (33): Brodo 23433B; (34): Brodo 24961.

***Acarospora canadensis* H. Magn.**

Infrequent; on calcareous rocks, in open or more or less shaded situations. (13): 2049, 2122; (14): 1975; (15): 3636; (34): Brodo 25485, 25490, Macoun 3646 (isotype). This species is characterized by the dense, immersed apothecia, one per areole, becoming *Lecanora*-like in appearance when mature. The dull red-brown, epruinose areoles easily separate this species from other *Acarospora* in southern Ontario. It should be noted, however, that the type has dispersed, non-contiguous areolae, whereas all other specimens have contiguous areolae and a continuous thallus. The two morphotypes may prove to be distinct.

***Acarospora cervina* Massal. var. *glaucocarpa* (Wahlenb. *in* Ach.) Körber** (Syn. *A. glaucocarpa* (Wahlenb. *in* Ach.) Körber)

Frequent; on calcareous rocks, in open or in shade. (13), (25), (27), (29), (31), (33), (34), (36).

***Acarospora fuscata* (Schrad.) Arn.**

Very common; on granitic boulders, cliffs, especially on bird perch rocks. It has also been found on sandstone, usually in open, sometimes in shaded areas. (12), (13), (14), (16), (25), (26), (27), (28), (31), (32), (33), (34), (36). This is one of the most common saxicolous species throughout the area.

***Acarospora sinopica* (Wahlenb.) Körber**

Rare; on non-calcareous rock. (27): 4491, Brodo 27591; (31): Brodo 20279.

***Acrocordia cavata* (Ach.) R. Harris**

Very rare; on a roadside *Populus*. (4): 1726.

***Anaptychia palmulata* (Michaux) Vainio**

Infrequent, on crystalline rocks or deciduous trees in forests. (16): White 316; (24): Macoun 77, 816; (27): Macoun 817; (31): Moore 6057; (34): 56, 823, 831, 3672.

***Anaptychia setifera* Räs.**

Rare; on conifereous trees or calcareous cliffs, in partially shaded areas. (13): 2058, Cain 25814; (24): Macoun 807; (28): Macoun 808; (33): 282. This species is characterized by having narrow lobes (less than 2 mm across) bearing long cilia grading into marginal rhizines; the undersurface is decorticate and there are spinules on the receptacle of apothecia. It has long been confused with *A. ciliaris* but the latter seems to be restricted to Europe.

***Anisomeridium biforme* (Borrer) R. Harris** (Syn. *Arthopyrenia biformis* (Borrer) Massal.)

Very rare; on stumps or the bark of *Ostrya virginiana*, in forests or swamps. (31): 3776, 3839.

***Anisomeridium nyssaegenum* (Ellis & Everhart) R. Harris** (Syn. *Arthopyrenia willeyana* R. Harris)

Rare; on bark of various trees in forests. (4): 1739; (32): 1369B; (34): 4349, 4365, 4375, 4528, Brodo 25498, 27629.

***Anzia colpodes* (Ach.) Stizenb.**

Very rare; probably extinct in this region, on trees in forests. (33): Billings s.n. Although superficially resembling a non-sorediate *Hypogymnia physodes*, the thick, highly branched, cushion-like, black hypothallus of *A. colpodes* makes it an easy species to recognize.

Arthonia (See key to *Bacidia*.)

Arthonia byssacea* **(Weigel) Almq.

Rare; on white cedar, in cedar swamps with *Lecanactis chloroconia* Tuck. (31): 3814; (34): 4522. While Wong and Brodo (1990) was in press, *A. byssacea* was reported from the Aspostle Islands in northern Wisconsin by Wetmore (1990).

Arthonia caesia **(Flot.) Körber**

Common; on bark of all kinds and fence posts, in the open or in forests. (3), (4), (5), (9), (12), (13), (21), (22), (25), (26), (27), (29), (30), (32), (33), (34), (35). This is the most common species of the genus in this area.

Arthonia diffusella* **Fink

Rare; only found on *Thuja*. (31): 3814; (32): 3979B, 3980, 3981, 3993.

Arthonia dispersa **(Schrad.) Nyl.**

Rare; on deciduous tree bark, in forests or swampy areas. (15): 3600; (30): 2553, 2919; (34): 4546, Brodo 13334.

Arthonia patellulata* **Nyl.

Rare; on poplar bark or rotten wood. (6): 2709B; (34): Macoun 2789.

Arthonia punctiformis **Ach.**

Rare; on deciduous tree bark. (27): Macoun 236, 643 (TRTC); (34): Macoun, 2 specimens, both have no number.

Arthonia radiata **(Pers.) Ach.**

Common; on bark of deciduous trees, in forests. (3), (4), (5), (10), (13), (14), (19), (20), (21), (27), (30), (31), (32), (33), (34), (35).

Arthopyrenia padi **Rabenh.** (Syn. *A. epidermidis* auct., *A. punctiformis* auct.)

Rare; on smooth bark of deciduous trees. (34): Macoun 148, 462. The very small, round ascomata, alga-less thallus, and the 2(-4)-celled spores, 15-20 x 4.5-6.0 μm, are the distinguishing characters of this species. It was treated under the name, *A. epidermidis* (DC.) Massal. in the Ottawa flora (Brodo 1988).

Arthothelium ruanum **(Massal.) Zw.** (Syn. *A. anastomosans* (Ach.) Arnold)

Rare; on bark of all kinds. (5): Macoun 499 (TRTC); (15): 3603; (34): Macoun 101, 102, 409 (TRTC).

Arthothelium spectabile **(Flotow *ex* Fr.) Massal.**

Infrequent; on deciduous trees. (20): Cain 20845, 22784, 25299, 25300, 25664, 27242 (all TRTC); (27): Macoun 234, 642 (TRTC); (32): Macoun 3025; (34): Macoun 110, 197, 412.

Aspicilia cinerea **(L.) Körber** var. *cinerea*

Frequent; on granitic boulders, in open or in shaded habitats. (10): 2721, 2724; (25): 3704, 4439; (27): Brodo 27600; (30): 2894, Dawson s.n.; (31): 2965; (33): 221, 502, 522, 2324; (34): Macoun 225. The thallus varies from pale yellow grey to dark olive grey and is usually thick; areolate to somewhat verrucose. This variety always produces norstictic acid.

Aspicilia cinerea **(L.) Körber** var. *laevata* **(Ach.) Körber**

Frequent; on granitic boulders, usually in shaded areas. (27): Brodo 27589; (31): 1392, 3911; (33): 415, 476, 3389, 3452, 3469, 3487, Brodo 9643; (34): 2844. This variety contains stictic acid, and usually has a much thinner, continuous to undulating thallus.

Aspicilia contorta **(Hoffm.) Krempelh.**

Rare; on calcareous rocks, in open areas. (27): 4326, 4339; (33): 301. The dispersed, convex, usually pruinose areoles of this species separate this species from others in the genus in southern Ontario.

Aspicilia verrucigera **Hue**

Frequent; on granitic boulders, in open or in shaded habitats. (14): 1958; (25): 3724, 3756; (29): 2516; (30): 511, 524, Dawson s.n.; (31): 1843, 3883, 3911, 3931, 4047; (33): 505, 3329B, 3333, 3334, 3376, 3481; (34): 2831, 2844. The thick, vermiform-verrucose thallus is the best character of this species.

Bacidia* s.lato and other lecideoid species with transversely septate, hyaline spores including *Arthonia, Bacidina, Biatora, Catillaria, Lecanactis, Micarea, Mycobilimbia, Rhizocarpon* and *Scoliciosporum)

1. On rocks 2
1. On moss, bark or decaying wood 10

2. Spores strongly curved and twisted in the ascus . . . . . *Scoliciosporum umbrinum*
2. Spores straight or slightly bent 3

3. Spores (especially young ones) with a thick, clear gelatinous "halo" or epispore outside of normal cell wall; spores ellipsoid to short-fusiform, 2 or 4 celled. *Rhizocarpon* spp.
3. Spores lacking a gelatinous epispore, fusiform to needle-shaped, 3-8 celled 4

4. Hypothecium hyaline 5
4. Hypothecium light to dark brown 7

5. Spores over 6 μm broad . . . . . *[Mycobilimbia] tetramera*
5. Spores less than 3 μm broad 6

6. Thallus smooth to granular; hypothecium and epihymenium hyaline to pale brown; spores 20-40 x 2-3 μm. on calcareous or non-calcareous rocks, rare . . . *Bacidina inundata*
6. Thallus finely divided and ascending, isidia-like growths at margins; hypothecium and epihymenium hyaline; spores 30-65 x 1.5-2 μm. On limestone, rare . . . . . *B.* sp.#2

7. Epihymenium and hypothecium hyaline to pale brown . . . . . *Bacidina inundata*
7. Epihymenium blue green; hypothecium brown 8

8. Spores acicular, 3-7-septate, 20-40 x 1.5-3 μm. On calcareous or non-calcareous rocks,infrequent . . . . . *B.* sp.#1, *sensu* Harris (1977)
8. Spores fusiform, 3-5-septate, over 3 μm broad 9

9. Spores 3-septate, 10-15 x 3-5 μm. On limestone or granitic boulders, rare. . . . *B. trachona*
9. Spores 3-5-septate, 20-30 x 6-8 μm. Occasionally directly on limestone, but usually over moss . . . . . *Mycobilimbia sabuletorum*

10. Spores single celled, occasionally 1-septate; apothecia yellow to red-brown; margin soon disappearing . . . . *Biatora helvola* or *vernalis* (see key to *Lecidea*, couplet 24)
10. Spores 1-7-septate, if 1-septate, then apothecia black 11

11. On moss 12

11. On bark and wood 16

12. Spores fusiform 15-30 x 5-8 μm 13
12. Spores acicular 30-65 x 1.5-2.5 μm 14

13. Apothecium pale yellow to buff, never darkening (except in poorly dried herbarium material); hypothecium pale yellow; spores constantly 3-septate, 5-20 x 5-6 μm. Infrequent . . . . . *Bacidia carneoalbida*
13. Apothecium pale brown to black, rarely yellowish hypothecium hyaline to pale brown or red brown; spores 3-5-septate, 15-30 x 6-8 μm. 15

14. Hypothecium brown; epihymenium greenish; spores 30-40 x 1.5-2.5 μm. Infrequent . . . . . *B. bagliettoana*
14. Hypothecium hyaline; epithecium hyaline; spores 30-65 x 1.5-2 μm. Rare . . . . . *B.* sp.#2

15. Spores 3-5-septate, 20-30 x 6-8 μm; hypothecium red-brown, brown, or rarely pale brown (especially above); hypothecium KOH+ reddish violet; apothecia tan, becoming brown or blackish. Common. . . . . *Mycobilimbia sabuletorum*
15. Spores constantly 3-septate, 15-30 x 6-7 μm; hypothecium hyaline to pale brown; apothecia yellow-brown to red-brown to black. Frequent . . . . . *[Mycobilimbia] tetramera*

16. Spores twisted, spirally arranged in ascus. On bark or wood, common . . . . . *Scoliciosporum chlorococcum*
16. Spores straight or bent, not spirally arranged in ascus 17

17. Apothecium lacking a proper margin; paraphyses indistinct; asci globose to pear-shaped . . . . . *Arthonia* spp.
17. Apothecium with a definite proper margin; paraphyses distinct; asci elongated 18

18. Spores relative short and broad, fusiform, under 30 μm long and over 4 μm broad, rounded ends 19
18. Spores longer and narrower, acicular, over 30 μm long and mostly less than 4 μm broad, at least one end pointed 29

19. Thallus with yellowish soredia in round soralia; apothecia pale brown; spores 3-septate, 13-20 x 4-5 μm. On cedar or decaying wood, rare. . . . . *Biatora epixanthoides*
19. Thallus not sorediate 20

20. Spores bent, more than 8 per ascus, 3-septate, 10-13 x 4-5 μm; apothecia black; epihymenium greenish black; hypothecium pale. On *Populus* and *Acer*, rare *B. populorum*
20. Spores straight, 8 per ascus, 1-5-septate 21

21. Spores 1-septate, 7-12 x 2-4.5 μm; paraphyses with swollen tips; apothecia black. On cedar . . . . . *Catillaria nigroclavata*
21. Spores 1-5-septate; paraphyses lacking swollen tips. 22

22. Hypothecium dark 23

22. Hypothecium pale, 3-septate 26

23. Apothecia remaining flat; margin distinct and persistent; spores 3-septate 24
23. Apothecia becoming hemispherical and without a distinct margin on mature apothecia; spores 1-5-septate 25

24. Hypothecium brown; apothecia often greenish, pruinose; margin raised; spores 13-16 x 3-4 μm. On *Thuja*, rare. . . . . *Lecanactis chloroconia*
24. Hypothecium red-brown; apothecium yellowish brown, brown to black, epruinose; margin not raised; spores 16.5-33 x 1.2-2.5 μm. On *Ulmus* and rotten wood, rare . . . . . *B. incompta*

25. Spores 1-3-septate, 16-19 x 5-6 μm; apothecia black and shiny. On logs and rottenwood,infrequent. . . . . *Micarea melaena*
25. Spores 3-5-septate, 20-30 x 6-8 μm; apothecia tan to brown or blackish, not shiny. On wood, moss or rock . . . . . *Mycobilimbia sabuletorum*

26. Apothecia whitish, yellowish to buff, never darkening; spores 15-20 x 5-6 μm, 3-septate (see couplet 13). . . . . *Bacidia carneoalbida*
26. Apothecia some shade of tan, brown or black, never yellowish 27

27. Apothecia brown to red-brown to black; spores 15-30 x 6-7 μm . . *[Mycobilimbia] tetramera*
27. Apothecia pallid to greenish black; spores 11-21 x 3-6 μm 28

28. Thallus greenish, granulose; apothecia pallid, or nearly black, often mottled; spores 11-20 x 3-5 μm. On bark or stumps of *Thuja*. infrequent . . . . . *Micarea peliocarpa*
28. Thallus whitish grey, more or less continuous; apothecia greenish black; spores 13-21 x 4-6 μm. Infrequent . . . . . *B. naegelii*

29. Apothecia more or less pruinose 30
29. Apothecia not pruinose 32

30. Thallus consisting of granules often becoming elongate and isidia-like; apothecia mostly epruinose or pruina restricted to apothecial margins; spores up to 9-septate, (40-)45-56 x 2.5-4 μm. On deciduous trees, infrequent . . . . . *B. rubella*
30. Thallus not isidiose-granulose 31

31. Apothecia bright red-brown to yellow-brown, rarely becoming very dark red-brown (almost black), at least young apothecia lightly pruinose, especially on the margins; margins low, often almost disappearing; hypothecium yellowish or orange to brownish, at least in upper part; exciple hyaline to yellow-orange, brown or purple-brown; exciple and hypothecium turn deep pink to red in KOH; thallus smooth; spores (3-)5-9-septate, (30-)33-60 x 2-3(-4.5) μm. On cedar and deciduous trees, frequent . . . . . *B. polychroa*
31. Apothecia dark red-brown, with prominent margins, usually heavily pruinose on disks and margins; hypothecium hyaline to pale yellow; exciple KOH+ pale yellow (never pink-violet); thallus becoming thick, rimose; spores 6-12(-15)-septate, 45-70(-72)

x 3-4 μm. On deciduous tree bark, infrequent . . . . . *B. suffusa*

32. Spores less than 45 μm long 33
32. Spores more than 45 μm long 35

33. Spores cylindrical, 29-36 x 3.5-5.0 μm. 7-septate; apothecia black, margin disappearing; hypothecium red-brown; epihymenium grey-olive; exciple hyaline to yellow-brown within. On bark, rare. . . . . *Cfr. Mycobilimbia accedens*
33. Spores needle-like, mostly 4 μm or less in width 34

34. Spores 3-7-septate, 24-36 x 2-3 μm; hypothecium pale brown; thallus thin, whitish crust, disappearing. On cedar, rare. . . . . *B. circumspecta*
34. Spores 3-septate, 16.5-33 x 1.2-2.5 μm; hypothecium red-brown; thallus thick, greenish grey. On *Ulmus* and rotten wood, rare . . . . . *B. incompta*

35. Apothecia yellow-brown, orange-brown to brown; thallus of isidioid granules . . *B. rubella*
35. Apothecia dark red-brown to black; thallus not isidioid granules 36

36. Apothecia less than 1 mm in diameter, dark red-brown to black; hypothecium hyaline to yellowish; epihymenium with a dark purple pigment; spores up to 17-septate, 45-60(-70) x (1.7-)2.2-4.0 μm; thallus smooth. On deciduous trees, rare . . . . *B. laurocerasi*
36. Apothecia large, up to 1.6 mm in diameter, pitch black; hypothecium brown grading into red-brown exciple which is paler to hyaline at margin; epihymenium green; spores 3-8-septate, 35-60(-66) x 2-3.5 μm; thallus smooth to granulose or almost isidiate. On bark of all kinds, rare . . . . . *B. schweinitzii*

***Bacidia bagliettoana* (Massal. & De Not.) Jatta**
Infrequent; on mosses or on soil, in the open. (15): 3631; (16): Cain 22606 (TRTC); (20): Cain 22772 (TRTC); (27): 2373; (31): 4180.

***Bacidia carneoalbida* (Müll. Arg.) Coppins** (Syn. *Bacidia sphaeroides* auct., *non* (Dickson) Zahlbr.)
Infrequent; on mosses, soil or rotten wood, usually in swampy areas. (10): Cain 18738 (TRTC); (27): Macoun 398 (TRTC); (31): 3841; (32): 4021; (34): Macoun 188. Gilbert et al. (1988) recently pointed out that the type of *Lichen sphaeroides* Dickson has mostly one-septate spores and is what has generally been called *Catillaria sphaeroides* (Massal.) Schuler (= *Biatora sphaeroides* (Dickson) Körber as listed in Egan [1990]). The latter species has not been found in southern Ontario. The oldest available name for *Bacidia sphaeroides* auct. is *Patellaria carneoalbida* Müll. Arg., transferred to *Bacidia* by Coppins (1989).

***Bacidia circumspecta* (Nyl. *ex* Vainio) Malme**
Very rare; one specimen collected from a cedar together with *B. polychroa*, in a *Thuja* swamp. (31): 3809.

***Bacidia incompta* (Borr. *ex* Hook.) Anzi**
Rare; on *Ulmus americana* and rotten wood. (6): 2709A, 2712; (34): Robitaille 149.4.

Bacidia inundata (Fr.) Körber (See *Bacidina inundata*.)

***Bacidia laurocerasi* (Del. *ex* Duby) Ozenda & Clauz.** (Syn. *B. atrogrisea* (Delise) Körber)
Very rare; on a oak in mixed forest. (31): 4035.

***Bacidia naegelii* (Hepp) Zahlbr.**

Infrequent; on deciduous trees in forests. (5): 1700; (9): 2628; (21): 3521; (25): 2220A; (27): Macoun 1790, 1791, 2733.

***Bacidia polychroa* (Th. Fr.) Körber**

Common; on bark of all kinds, in forests or swamps. (15): 3596; (21): 3545; (24): 3194; (27): Macoun 3049; (29): 855B; (31) 3809, 3817, 4094, Brodo 25211, 25212; (32): 3981; (34): Brodo 27630, Macoun 258 & 2801 (CANL), 280, 390 & 391 (TRTC).

***Bacidia populorum* (Massal.) Trev.**

Rare; on deciduous trees in forests. (21): 3519, 3521; (24): Macoun 178.

***Bacidia rubella* (Hoffm.) Massal.**

Infrequent; on bark of deciduous trees in forests. (20): Cain 25309, 25311 (TRTC); (27): Brodo 27622; (31): Brodo 25250; Ireland 15886; (32): Shchepanek 203A.

***Bacidia schweinitzii* (Tuck.) Schneider**

Common; on bark of all kinds in forests or swampy areas. (10), (15), (16), (18), (20), (21), (27), (29), (30), (31), (32), (34).

***Bacidia suffusa* (Fr.) Schneid.**

Infrequent; on bark of various trees in forests or swamps. (16): White 320; (27): Macoun 2805, 3049; (31): Brodo 25122; (32): 3976; (34): Macoun 220, 261, 392, 2807; (35): Macoun 72.

***Bacidia trachona* (Ach.) Lett.**

Rare; on limestone or granitic boulders in forests or shaded situations. (19): 2577; (36): 1195, 1199.

***Bacidia* sp. #1** sensu Harris (1977)

Infrequent; on calcareous or non-calcareous rocks in open situations. (12): 2766; (13): 2051; (30): 2888; (31): 1381; (34): Brodo 7513. See comments under *Bacidina inundata*.

***Bacidia* sp. #2**

Rare, in mosses or on limestone. (31): 4042, 4141B. These two specimens were both collected from Renfrew County. One was growing on moss over rock at water's edge and the other was collected from a limestone in a forest.

***Bacidina inundata* (Fr.) Vězda**

Rare; on granitic or calcareous rocks, in shaded or open situations. (10):2725; (27): 2230; (34): 4545. This species was recently transferred to the new genus *Bacidina* by Vězda (1990). It is usually found in or near water, but this was not the case with any of the three southern Ontario specimens. *Bacidia* sp. #1 (sensu Harris 1977), a more common saxicolous species in southern Ontario, is very similar to *Bacidina inundata*, but its epihymenium and hymenium are green whereas those of *B. inundata* are colorless. It remains to be seen whether it is better classified as a *Bacidia* or a *Bacidina*.

***Baeomyces fungoides* (Swartz) Ach.)** (Syn. *B. roseus* Pers.)

Rare; on sandy soil. (2): Fowler 2599; (26): 4507. This is the only terricolous species of the genus found in southern Ontario. Although rarely found, it forms large colony where ever it occurs. The pinkish apothecia of this species are very distinctive, unlike the brownish ones of *B. rufus*. We compared tropical material of *B. fungoides* with our temperate collections and could find no characters that can separate them. The "pruinose warts on a smooth thallus" said to be characteristic of *B. roseus* by de Vries and Sipman (1984) were also found on West Indies material in CANL.

***Baeomyces rufus* (Hudson) Rebent.**

Very rare; our only specimen was on granitic rock near water. (25): 4484. This specimen is sterile but the identity can be confirmed by its presence of stictic and trace of norstictic acids.

***Biatora botryosa* Fr.** (Syn. *Lecidea botryosa* (Fr.) Th. Fr.)

Rare; on charred wood. (21): 1877; (32): Brodo 14601. We have adopted the new classification of this species suggested by Hertel (1988). (See key to *Lecidea*.)

***Biatora epixanthoides* (Nyl.) Diederich** (Syn. *Bacidia epixanthoides* (Nyl.) Lettau) (See key to *Bacidia*.)

Rare; on *Thuja* or decaying wood. (10): Cain 3740; (32): 4022.

***Biatora helvola* (Körber) Hellbom** (Syn. *Lecidea helvola* (Körber) H. Olivier) (See key to *Lecidea*.)

Very rare; on bark of a tree. (34): Macoun 187.

***Biatora vernalis* (L.) Fr.** (Syn. *Lecidea vernalis* (L.) Ach.) (See key to *Lecidea*.)

Rare; in mosses over rocks or over bases of cedar trees, in shaded situations. (31): 3813; (34): Macoun 398.

***Bryoria furcellata* (Fr.) Brodo & Hawksw.**

Common; on bark and branches of various coniferous trees, rotten wood or rock cliffs. It is frequent, but not abundant, and is usually found only one or two thalli per tree. (20), (21), (22), (27), (29), (30), (31), (32), (33), (34). Most modern specimens of this species from southern Ontario are rather depauperate, and many records are very old. The species was undoubtedly much more abundant in the past before the white pine forests were cut and air pollution decimated the remaining populations (see Fig. 4).

***Bryoria trichodes* (Michx.) Brodo & Hawksw.** subsp. ***trichodes*.**

Very rare; the only specimens were collected from a *Larix* by Macoun in Ottawa region. (34): Macoun 20 (TRTC). This species is new to southern Ontario but it is very common in northern Ontario. Air pollution may well have extirpated this species from our region.

****Buellia arnoldii* Servít**

Rare; on conifer trees in swamps or roadsides. (31): Brodo 25263; (32): 3984, 4002.

****Buellia polyspora* (Will.) Vainio**

Rare; on deciduous trees in forests. (4): Macoun 402; (21): 3533.

***Buellia punctata* (Hoffm.) Massal.**

Very common; on bark of all kinds, on rotten wood, and also on rocks; in open or shaded habitats. (3), (4), (5), (6), (9), (10), (12), (14), (15), (17), (19), (20), (21), (24), (25), (27), (28), (29), (31), (32), (33), (34), (36). This species is one of the most common crustose lichens in southern Ontario.

***Buellia schaereri* De Not.**

Rare; on *Pinus strobus* and lignum. (25): Brodo 27612; (36):1232. This species has the smallest spores (7-8.5 x 3-3.6 μm) in the genus. It normally has a thin hypophloedal thallus, but the southern Ontario specimen are rather thick, apparently parasitic on some other lichen.

***Buellia stillingiana* J. Stein.**

Frequent; on bark of all kinds in forests. (16), (25), (26), (30), (31), (32), (34), (35). This species is very similar in general appearance to *B. arnoldii* but it differs from the latter in lacking oil droplets in the hymenium and in having a "T"-shaped, grey apothecial stipe, with a more or less uniformly brown-black exciple. In addition to this, *B. arnoldii* has much larger spores (30-33 x 11-12 μm) than those of *B. stillingiana* (10-15 x 5-7 μm). Moreover, *B. arnoldii* contains atranorin (KOH$\pm$ yellow) whereas *B. stillingiana* contains norstictic acid (KOH+ red).

***Buellia turgescens* Tuck.**

Rare; on granitic boulders in open habitats. (29): 4205, Brodo 9711; (33): 3399; (34): Brodo 13302. This distinctive saxicolous species has a thick, brownish grey verrucose to granulose thallus with the apothecia either partially sunken into the verrucae or, more commonly, sessile.

***Caliciales* (including *Calicium, Chaenotheca, Chaenothecopsis, Cyphelium, Microcalicium, Mycocalicium, Phaeocalicium, Sphinctrina* and *Stenocybe*.)**

1. Ascocarps without a stalk; mazaedium in thalline verrucae appearing like a lecanorine apothecium; thallus yellow-green, subareolate and subsquamulose 2
1. Ascocarps at the summit of a short or long hair-like stalk 3

2. Spores 2-celled. Often found on dead standing trees near streams or lakes, infrequent . . . . . *Cyphelium tigillare*
2. Spores submuriform. Rare . . . . . *Cyphelium notarisii*

3. Spores mostly spherical to subspherical 4
3. Spores elliptical to cylindrical 9

4. Spores with hyaline sheaths, mostly spherical, 8-11 μm, the remainder slightly elongate to bullet-shaped (pointed at one end); cell wall irregularly sculptured; apothecium with a very short stalk (less than 0.5 mm). Parasitic on lichens. . . . . *Sphinctrina anglica*
4. Spores without hyaline sheath; apothecium with stalk longer than 0.5 mm. 5

5. Apothecium with a yellow pruina below. 6
5. Apothecium with a white pruina below or epruinose 7

6. Epiphloedal thallus absent; photobiont large, round to irregular cells, with orange oil drops (*Trentepohlia*); within substrate. On cedar, rare . . . . *Chaenotheca hispidula*
6. Epiphloedal thallus present, bright greenish yellow, leprose, fairly thick; photobiont small cylindrical cells, without orange oil drops (*Stichococcus*). On conifer or stumps, infrequent. . . . . *Chaenotheca furfuracea*

7. Apothecium with a white pruina below; thallus thin, granular, verrucose or squamulose; gray-green; photobiont *Stichococcus* (see couplet 6). On conifer or stumps, rare . . . . . *Chaenotheca trichialis*
7. Apothecium epruinose, although occasionally appearing pruinose in *Chaenotheca brunneola*; thallus thick or absent; photobiont with spherical cells (Chloroccales) 8

8. Thallus thick, verrucose, white to greenish-white, often with interspersed orange granules that react K+ red; exipulum well developed. Infrequent . . . . . *Chaenotheca ferruginea*
8. Thallus absent; exipulum poorly developed. On stumps or on polypore fungi growing on *Abies balsamea*, rare . . . . . *Chaenotheca brunneola*

9. Spores non-septate 10
9. Spores septate. 12

10. Apothecium with a yellow-green pruina; mazaedium dark brown or black; mature spores very variable in size and shapes, ellipsoidal or cylindrical, 0-3-septate (septa poorly developed), with very uneven surface, pale brown, 6-11.5 x 3-4 μm. On cedar, rare . . . . . *Chaenotheca laevigata*
10. Apothecium epruinose; no mazaedium 11

11. Ascus wall with a distinct thickening at the tip penetrated by a fine canal (best seen in lactophenol/cotton blue); spores pale brown, 5-6.5 x 2.5-3 μm. On *Thuja occidentalis*, rare. . . . . *Chaenothecopsis savonica*
11. Ascus wall with a uniform thickening at the tip, no canal; spores dark brown, 7-9 x 2.5-3.5 μm. Infrequent . . . . . *Mycocalicium subtile*

12. Mazaedium present, the asci disintegrating early 13
12. Mazaedium absent, the asci not disintegrating. 18

13. Mazaedium with a greenish tinge; spores with distinct spiral ornamentation; stalk rough, appearing granular under dissecting scope. Parasitic on *Psilolechia lucida*, rare . . . . . *Microcalicium arenarium*
13. Mazaedium brown or black; spores smooth or with uneven surface but not distinctly spirally marked; stalk smooth 14

14. Mazaedium brown; spores pale brown, 0-3-septate . . . . . *Chaenotheca laevigata*
14. Mazaedium black; spores dark brown, 1-septate, deeply constricted at septum, ornamented on surface 15

15. Asci clavate; rim of apothecium margin (excipulum) white-pruinose; pycnidia common; spores 8-11 x 3.5-5 μm. On conifer, rare . . . . . *Calicium parvum*
15. Asci cylindrical; excipula pruinose or epruinose; pycnida absent 16

16. Excipula yellow-pruinose, often only on the rim. On stumps or logs, rare . . . . . *Calicium trabinellum*
16. Excipula white-pruinose or epruinose 17

17. Excipula epruinose; spore with an ornamentation consisting of minute warts, 11-15(-18) x 6-7(-8) μm. On *Pinus strobus*, rare . . . . . *Calicium abietinum*
17. Excipula white-pruinose; spore with an irregular ornamentation; 9-14 x 4-7 μm. On *Thuja occidentalis*, very rare . . . . . *Calicium glaucellum*

18. Ascus wall with a distinct thickening at the tip penetrated by a fine canal, most spores less than 10 μm long 19
18. Ascus wall with a uniform thickening at the tip, no canal, most spores more than 10 μm long 20

19. Apothecium K+ red; stalk greenish HNO_3-, associated with *Stichococcus* (see

couplet 6), often parasitic on *Chaenotheca*, rare . . . . . *Chaenothecopsis lignicola*

19. Apothecium K-; stalk reddish-brown HNO_3+ red, not associated with algae. On stumps, rare . . . . . *Chaenothecopsis debilis*

20. Majority of spores 1-septate 21

20. Majority of spores 3-septate 23

21. Spores pale brown; stalk with greenish hyphae that appear rectangular and plate like. On polyporous fungi, rare . . . . . *Phaeocalicium polyporaeum*

21. Spores dark brown; stalk with brown hyphae that appear narrow and elongate. On bark 22

22. Restricted to *Populus* spp..Hyphae in outer part of stalk hyaline; rare . . . . . *Phaeocalicium populmeum*

22. Restricted to *Rhus typhina*. Hyphae in outer part of stalk not hyaline; common . . . . . *Phaeocalicium curtisii*

23. Stalk shorter than 0.8 mm, often branched; spores 13-16 x 4-6 μm. On *Alnus incana* ssp. *rugosa*, rare . . . . . *Stenocybe pullatula*

23. Stalk taller than 0.8 mm, not branched; spores 21-30 x 6-8 μm. On conifers, most often on *Abies balsamea*, rare . . . . . *Stenocybe major*

***Calicium abietinum* Pers.**

Very rare; on a pine tree at Petroglyphs Provincial Park. (25):3677. This specimen agrees well with the description of Tibell (1975).

***Calicium glaucellum* Ach.**

Very rare; on *Thuja occidentalis* stump. (27): Selva 4186B. The thallus is immersed in the substrate which develops a whitish cast. It is best distinguished from *C. parvum* by its lack of pycnidia and cylindrical asci.

***Calcium parvum* Tibell**

Rare; on conifereous trees. (25): 4436, Selva 4169; (31): Tibell 4638 (holotype). The relationship of this species and *C. glaucellum* mentioned above.

***Calicium trabinellum* Ach.**

Rare; on decomposing stumps and logs. (25): Selva 4178A; (27): Selva 4184. It is best distinguished from the other southern Ontario species of *Calicium* by its yellow-pruinose apothecia.

Caloplaca

1. On bark or wood 2

1. On rock 8

2. Thallus with soredia 3

2. Thallus without soredia 4

3. Thallus yellowish orange to orange; areolate to effigurate subsquamulose, with small circular, orange to dark orange soralia. On wood and bark of all kinds, frequent ..... *C. microphyllina*

3. Thallus yellow to yellowish white, more or less continuous, smooth, not effigurate subsquamulose; soralia large and irregular. On fence posts, rare ..... *C. discolor*

4. Thallus white, grey, or absent 5

4. Thallus pale sulphur yellow, more or less continuous; apothecia frequent, orange with paler margin; spores 11-16 x 6.5-9 μm, isthmus 3.5-5.5 μm. On rotten logs, rare ..... *C. flavorubescens*

5. Apothecia with a conspicuous, persistent grey margin 6

5. Apothecia margin when mature, yellow, orange or rusty red 7

6. Apothecial margins white pruinose; apothecial disks yellow pruinose; thallus often becoming squamulose; apothecia 0.5-1.5 mm in diameter. On deciduous trees or rotten wood, infrequent ..... *C. ulmorum*

6. Apothecial margins and disks epruinose or almost so; thallus ashy grey, not squamulose; apothecia 0.4-0.9 mm in diameter. On deciduous trees, usually on *Populus*, frequent ..... *C. cerina*

7. Apothecial margin yellow or orange in most mature apothecia, slightly paler than the disk (a partially thallus-colour margin is sometimes seen in young apothecia); apothecia small, 0.3-0.5 mm in diameter, dark orange to yellow-orange; spores 10.5-13.0 x 6-8 μm, isthmus 3.5-6 μm. On wood or bark of all kinds, common ..... *C. holocarpa*

7. Apothecial margin and disk rusty red to darkened rusty red; apothecia to 1 mm in diameter; spores 13-16 x 8-9 μm, isthmus 4-6 μm. On *Thuja* or fence rails, rare ..... *C. ferruginea*

8. Thallus with soredia, yellow to orange 9

8. Thallus without soredia, grey, or yellow, orange 11

9. Thallus of radiating lobes 10

9. Thallus of scattered or contiguous yellow areoles with yellow soredia, sometimes becoming entirely sorediate in the center, often sterile. On limestone, rare ..... *C. citrina*

10. Soredia lemon yellow at the base of the lobes; lobes entirely crustose (without a lower cortex). On limestone in open, rare ..... *C. cirrochroa*

10. Soredia orange like thallus, very coarsely granular, on lobe surface; lobes often with a lower cortex especially at periphery. On calcareous rocks . *Xanthoria sorediata*

11. Thallus with distinct, elongate lobes, frequently corticate on lower surface. Common on calcareous or bird-perch rocks especially at lake edge .... *Xanthoria elegans*

11. Thallus, if present, not lobate 12

12. Apothecial margins at first thallus-coloured, becoming dark grey to

black; disk yellow to orange-brown; thallus brownish grey, thick, areolate. On granitic boulders, frequent ..... *C. sideritis*

12. Apothecial margins yellow to orange 13

13. Thallus inconspicuous or absent, blackish or grey if present; spores isthmus very narrow 14

13. Thallus conspicuous, pale sulphur yellow, or orange 15

14. Apothecia small, under 0.4 mm across, dull orange to orange-brown; apothecial margins paler than disk, usually yolk-yellow; spores 14-16 x (6-)7-9 μm; thallus often seen as a blackish crust around apothecia. On limestone and concrete in open, common ..... *C. feracissima*

14. Apothecia 0.25-0.75 mm in diameter, bright orange to dark orange, margins paler to almost the same colour as disk; spores 10-14 x 4-6 μm; thallus usually absent, never blackish. On rock of all kinds, frequent ..... *C. arenaria*

15. Spores 15-18(-20) x 6-8 μm, isthmus very narrow, less than 1/4 spore length (1.5-2 μm); apothecia orange, with thick yellow margins, usually expanded and fused with thallus; thallus yellow, more or less continuous ..... *C.* sp.

15. Spores under 15 μm long, isthmus more than 1/3 spore length (3-7 μm) 16

16. Thallus continuous or areolate, pale sulphur yellow or greenish yellow; apothecia with orange or orange red disk (sometimes more or lesspruinose) and paler margin or almost the same colour as disk when mature; spores 12-15 x 6-8 μm, isthmus mostly wider than 4.5 μm (3-7 μm) ..... *C. flavovirescens*

16. Thallus areolate, with more or less lobate margins, deep yellow to yellowish orange; apothecia with orange disk and almost the same colour margin; spores 10.5-14 x (4.5-)6-7.5 μm, isthmus (2-)3-4(-4.5) μm ..... *C. velana*

***Caloplaca arenaria* (Pers.) Mull. Arg.**

Common; on granitic boulders, rarely on calcareous rocks, usually in open. (14): 1942; (16): Cain 25414; (25): 4400, 4456; (28): 2354; (30): 2883; (31): 2992. 3028, 4160; (33): 303, 2280, 3400; (34): 1863, 2787, Macoun 1763, Shchepanek 7; (36): Brodo 7519. This species is comparatively common in southern Ontario.

***Caloplaca cerina* (Ehrh. *ex* Hedw.) Th. Fr.**

Frequent; on deciduous trees usually on *Populus*, in forests. (10): Cain 2723; (27): Macoun 2984; (29): 4239; (31): 4129; (34): Macoun 9, Shchepanek 137; (35): 1172; (36): 1222, 1229.

***Caloplaca cirrochroa* (Ach.) Th. Fr.**

Rare; on limestone in open habitats. (13): 2091; (30): Hanes, A. s.n. This distinctive saxicolous species has a thallus of radiating lobes with, delimited, excavate soralia bearing lemon yellow soredia near the base of the lobes. This species seems to be narrowly restricted to limestone cliffs near water in southern Ontario. *Xanthoria sorediata* is somewhat similar, but has larger, thicker, more convex lobes, and has coarse granular soredia not formed in orbicular or excavate soralia.

***Caloplaca citrina* (Hoffm.) Th. Fr.**

Rare; on limestone, in forests or shaded situations. (13): 2139; (19): 2576; (34): Brodo 22786. This species has a distinctive yellow-orange, granular sorediate thallus. The thallus consists of scattered or contiguous yellow areoles.

****Caloplaca discolor* (Tuck.) Fink**

Very rare; on fence posts. In other parts of its range, it occurs on tree bark as well. (33): 1297.

***Caloplaca feracissima* H. Magn.**

Common; on limestone or concrete in the open. (13), (14), (15), (17), (19), (27), (28), (29), (31), (33), (34). This species is sometimes confused with *C. arenaria*, but the smaller (less then 25 mm across) dark orange to orange-brown apothecia usually subtended by a trace of black prothallus, the yellowish, almost totally absent thallus, and the larger spores (14-16 x 7-9 μm) with narrow isthmi combine to make this species rather distinctive and easily identified. Besides, this species is extremely common on concrete and sidewalks or even cemented fences; *C. arenaria* is more common on granitic boulders, rarely on calcareous rocks.

****Caloplaca ferruginea* (Hudson) Th. Fr.**

Rare; on *Thuja* or fence rails. (24): Macoun 166; (27): 43348.

***Caloplaca flavorubescens* (Hudson) Laundon**

Rare; on rotten log at roadsides. (3): 1650, 1658; (33): 1280.

***Caloplaca flavovirescens* (Wulfen) Dalla Torre & Sarnth.**

Common; on rocks of all kinds in shaded and open habitats, frequently found on boulders near water. (10), (13), (14), (25), (27), (29), (31), (33), (34), (36).

***Caloplaca holocarpa* (Hoffm.) Wade**

Common; on wood, bark of all kinds, found from exposed field to dense forests. (3), (9), (15), (16), (17), (20), (21), (27), (28), (29), (31), (32), (33), (34). This is the most common corticolous *Caloplaca* in southern Ontario.

***Caloplaca microphyllina* (Tuck.) Hasse**

Frequent; on wood and bark of all kinds, usually found in the open on roadside fence rails. (5): 1711; (10): Cain 22056 (TRTC); (16): Cain 20252 (TRTC), 21685; (27): 2426; (28): Brodo 9687; (32): Brodo 9737; (33): 280; (34): Brodo 18805, 18806, 23538, Tibell 4649. *Caloplaca microphyllina* differs from *C. discolor* in its thallus: small, effigurate, subsquamulose areoles with small punctiform, orange to dark orange soralia, rather than a more or less continuous, smooth, thallus not effigurate-subsquamulose; soralia light orange, larger, rounded to irregular.

****Caloplaca sideritis* (Tuck.) Zahlb.**

Rare; on granitic boulders, in shaded or open situations. (30): 2905; (31): 2963; (33): 452, 3437A, Brodo 25265.

***Caloplaca ulmorum* (Fink) Fink**

Infrequent; on deciduous trees or rotten wood, in more or less open situations. (3): 1650; (22): 3184 (Brodo: Lich. Can. Exs. 157), 3185; (32): Shchepanek 205; (31): 4129.

****Caloplaca velana* (Massal.) DuRietz**

Frequent; on calcium-containing rocks, often found in open field. (12): 2742; (13): Schueler 21426E; (14): 1973, 1976B, 1981B; (27): 2411, 2412; (29): 2466; (31): 1415, Brodo 23544.

***Caloplaca* sp.**

(33): 3456. This lichen was found on limestone near water at St. Lawrence Islands National Park. Although the dull orange and more or less lobate margin is similar to the thallus of *C. saxicola*, the narrow isthmus (1.5 - 2 μm) suggests that it is another species.

***Candelaria concolor* (Dickson) B. Stein**

Very common; on trees of all kinds or granitic boulders or cliffs. (1), (3), (4), (5), (6), (9), (14), (15), (16), (17), (19), (20), (25), (27), (30), (31), (32), (33), (34), (35), (36). This is one of the most common foliose species in southern Ontario. Due to its showy yellow colour and abundance, it can often be seen from a distance, most often on roadside trees, together with *Xanthoria fallax*.

***Candelaria concolor* (Dickson) B. Stein var. *effusa* (Tuck.) Brunh.**

Infrequent; on fence posts or deciduous tree bark, in forests or roadsides. (14): 1920; (15): 3586; (21): 3536; (27): 2396; (32): Brodo 7504; (34): 435, Brodo 18762, Ley 357.

***Candelaria fibrosa* (Fr.) Müll. Arg.**

Rare; on bark of deciduous trees. (24): Macoun 560; (32): Macoun 559; (34): Macoun 5, 236, 286.

***Candelariella aurella* (Hoffm.) Zahlbr.**

Common; on limestone, occasionally on non-calcareous rocks, fence posts or old cedar. (13): 2076; (14): 1981A; (16): Cain 50317; (17): Cain 25657; (25): 4400; (29): 2456; (31): 1416; (33): 1283, 1284, 1292, 1293,1304; (34): Brodo 14450, Macoun 3613.

***Candelariella efflorescens* R. Harris & Buck**

Common; on trees of all kinds; in wooded or open situations. (14), (15), (21), (25), (26), (27), (28), (29), (30), (31), (32), (33), (34).

***Candelariella vitellina* (Hoffm.) Müll. Arg.**

Very common; on rocks of all kinds, various kinds of trees, fence rails or rotten wood. (1), (3), (4), (12), (14), (15), (16), (20), (25), (27), (28), (29), (30), (31), (32), (33), (34), (36).

***Candelariella xanthostigma* (Ach.) Lett.**

Common; on trees of all kinds, fence posts or rotten wood. (1), (3), (4), (5), (25), (29), (31), (32), (33), (34).

***Catapyrenium lachneum* (Ach.) R. Sant.**

Rare; on soil or silt.(16): Cain 22609, 25587, 28953 (all TRTC); (27): 2372, 2387. Following Thomson (1987), we are regarding *Dermatocarpon hepaticum* (Ach.) Th. Fr. and *Catapyrenium lachneum* as conspecific. This is the only terricolous, squamulose-foliose lichen with perithecia. It is most similar to *Dermatocarpon* species, all of which occur on rock and are more or less umbilicate.

***Catillaria nigroclavata* (Nyl.) Schul.** (See key to *Bacidia*.)

Rare; on *Thuja*. (15): 3596, 3625; (25): 3176, 3181; (31): 3011; (34): 4361, Brodo 27633. This species has been confused with *C. glauconigricans* but the latter has a very well developed, more or less areolate thallus and larger apothecia and has not yet been found in southern Ontario. *Catillaria nigroclavata* has been recorded from Michigan, W. Virginia and northern Ontario, but is new to southern Ontario. It is an addition to the lichen flora of the Ottawa region.

***Catinaria laureri* (Th. Fr.) Degel.**

Infrequent; on maple, beech or dead wood in forests. (13): 1988; (16): Cain 26702 (TRTC), Walker 183, White 2832; (21): Cain 25726 (TRTC); (27): Ireland 15919, Macoun 2727; (30): 2552; (34) Macoun 397, 2729, 2730, 2731.

***Cetraria arenaria* Kärnef.**

Frequent; on sandy soil at lake shore or open field. (3): Cain 22514 (TRTC); (13): Cain 25806, 27243, Stewart 222; (21): Cain 25726 (TRTC), 28268 Keddy 128; (25): 3732; (29): 2438, Brodo 9678; (34): Grimm s.n. This is the only member of the *Cetraria islandica* group in southern Ontario.

***Cetraria aurescens* Tuck.**

Very rare; the only specimen was collected from a branch by R.F. Cain. (29): Cain 27062 (TRTC). The light yellowish green thallus and white medulla of this species, superficially looks like a species of *Parmelia*, but with its abundant marginal pycnidia, it can hardly be confused with any other lichen in southern Ontario.

Cetraria ciliaris* Ach. var. *ciliaris

Infrequent; on fence rails or branches of trees, mostly conifers. (21): 25722 (TRTC); (27): Cain 27112, Macoun 2891; (31): 1824; (34): Macoun 217, 277, 3434

***Cetraria ciliaris* Ach. var. *halei* (Culb. & C. Culb.) Ahti** (Syn. *Tuckermannopsis americana* (Sprengel) Hale)

Common; on conifer trees or fence rails. (13), (20), (21), (22), (24), (26), (29), (30), (31), (33), (34), (35).

***Cetraria oakesiana* Tuck.**

Frequent; on shaded rocks or bark (usually conifers) or rotten wood; in forests. (20): Cain 22762; (25): 3751; (31): 1819, 3839, 4044; (32): 3224, Brodo 14579; (33): 252, 3495, Brodfo 9647; (34): Macoun 28, 3460.

***Cetraria orbata* (Nyl.) Fink** (Syn. *Tuckermannopsis orbata* (Nyl.) Lai)

Rare; on conifer trees. (13): 2005, Johnson 9; (27): Cain 27112 (TRTC). This species has a disjunct range in eastern and western North America (Culberson and Culberson 1967). It is closely related to *C. ciliaris*, but lacks depsides, and depsidones (medulla C-, UV- [long wave]), and can become ± isidiate at the margins.

***Cetraria pinastri* (Scop.) S. Gray**

Rare; on stumps, twigs, or bark of conifers or birch. (30): Ward 337; (34): 1343, Brodo 14620, Macoun 281.

***Cetrelia olivetorum* (Nyl.) Culb. & C. Culb.**

Frequent; on shaded rocks, especially cliffs, wood or bark of all kinds. (12), (24), (27), (30), (31), (32), (33), (34), (35). This is the only species of *Cetrelia* found in southern Ontario. It is morphologically identical to *C. chicitae* but differs in chemistry. *Cetrelia olivetorum* has olivetoric acid (medulla C+, KC+ red) and *C. chicitae* contains alectoronic acid (medulla C-, KC+ pink) *C. chicitae* has not been reported for southern Ontario.

Chaenotheca (See key to Caliciales.)

***Chaenotheca brunneola* (Ach.) Müll. Arg.**

Rare; on stump of conifer or on polypore growing on dead *Abies*. (21): Cain 28596; (27): Brodo 27623, Selva 4189; (32): 4024. In Canada, this species was reported from northern Ontario, British Columbia and Newfoundland by Tibell (1975). It is widely distributed in the northern Boreal to Temperate zone.

***Chaenotheca ferruginea* (Turner & Borrer) Mig.**

Infrequent; on conifer stumps, wood or fence rails in open. (25): Selva 4180A; (27): 4496; (31): 3807, Brodo 25216; (34): Brodo 24959. In North America it is widely distributed from the middle Boreal to Temperate zone, and is known from British Columbia and northern Ontario.

***Chaenotheca furfuracea* (L.) Tibell**

Infrequent; on stump of conifers, upturned roots or dead trunks. (10): Cain 14605, Cain 1962 (TRTC); (20) Cain 16601, 18788 (TRTC); (25): Selva 4178A; (27): Selva 4185A; (34): Macoun 3790.

***Chaenotheca hispidula* (Ach.) Zahlbr.**

Very rare; on a cedar trunk in Renfrew County. (31): 3814. Tibell (1975) reported a few specimens from the Thunder Bay District, Ontario.

***Chaenotheca laevigata* Nadv.**

Rare; the only specimen was collected from a cedar in Lanark County. (32): 4015. This species, reported from the Thunder Bay District, Ontario and British Columbia, is found in the Hemiboreal to the Lower Oroboreal zone.

***Chaenotheca trichialis* (Ach.) Th. Fr.**

Rare; on conifer and stumps. (21): 3554; (25): Selva 4171B, 4174A; (27): Selva 4184. This species may be confused with *C. brunneola* but can be distinguished from the latter by its white-pruinose apothecia. In Canada, it is known from northern Ontario, Alberta and British Columbia.

Chaenothecopsis (See key to Caliciales.)

***Chaenothocopsis debilis* (Turner & Borrer *ex* Schaerer) Tibell**

Rare; on decorticated stump. (25): 4445, Selva 4177A; (31): 4095, Tibell 4643, (Tibell 1975); (34): Tibell 4647 (Tibell 1975).

***Chaenothecopsis lignicola* (Nadv.) A. Schmidt**

Rare; on stump of *Pinus* or parasitic on *Chaenotheca trichialis*. Verified or determined by S. Selva. (21): 3554; (25): 4482, Selva 4171B.

***Chaenothecopsis savonica* (Räs.) Tibell** (Syn. *Mycocalicium savonicum* Räs., *Chaenotheca savonica* (Räs.) Tibell)

Very rare; on *Thuja occidentalis* stump growing with *Mycocalicium subtile*. Determined by S. Selva. (27): Selva 4186A.

***Cladina arbuscula* (Wallr.) Hale & Culb.**

Rare; on soil at ridge top. (29): 2505; (33): 338, Wallace 292B, 345A, 580, 627. Many of the more robust, thicker thalli of *C. mitis* resemble *C. arbuscula*, and may, in fact, be the PD- strain of that species. All the specimens cited here are PD+ red.

***Cladina mitis* (Sandst.) Hustich**

Common; on soil or thin soil over boulders, rarely on decaying wood in open fields. (13), (15), (21), (22), (25), (27), (29), (30), (31), (32), (34), (35).

***Cladina rangiferina* (L.) Nyl.**

Common; on soil or boulders in exposed fields. (10), (13), (21), (25), (27), (29), (30), (31), (32), (33), (34).

***Cladina stellaris* (Opiz) Brodo**

Frequent; on soil in open fields. (13), (21), (25), (29), (31), (33), (34), (35).

***Cladina stellaris* (Opiz) Brodo** var. ***aberrans* (des Abb.) Ahti**

Very rare; in an open field (22): 3658. This variety is morphologically similar to *C. stellaris* but differs in containing psoromic acid (PD+ yellow). Ahti (1964) recorded it from northern Ontario.

***Cladonia acuminata* (Ach.) Norrl.**

Infrequent; on soil, rotten logs or thin sandy soil over rocks. (17): Macdonald 5074; (29): 835; (31): 4032B; (33): Wallace 876; (34): 3235, Brodo 18803, Macoun 47.

***Cladonia acuminata* (Ach.) Norrl.** var. ***norrlinii* (Vainio) Lynge**

Rare; on thin soil over rock, or directly on soil in open. (9): Smocovitis 62; (33): Wallace 877, 895 , 907; (34): 2814, Brodo 14614 , 22754. It has been reported from northern Ontario by Ahti (1964)

***Cladonia bacillaris* Nyl.**

Very common; on stumnps, wood, fence posts, soil or rocks, in open or occasionally in forests. (4), (5), (9), (10), (14), (15), (19), (21), (22), (24), (29), (31), (32), (33), (34), (36). This species has recently been regarded as only a chemical race of *C. macilenta* by Christensen (1987). (i.e., having barbatic rather than thamnolic acid). For the present, we are recognizing the two as distinct.

***Cladonia botrytes* (Hag.) Willd.**

Rare; on soil or stumps, in open or shaded situations. (24): Macoun 2329; (34): 1323.

***Cladonia caespiticia* (Pers.) Flörke**

Infrequent; on old logs, wood or humus, usually grows over mosses in shaded localities. (13): 2137; (27): Brodo 27602; (33): Wallace 886; 34: Macoun 156 , 264.

***Cladonia cariosa* (Ach.) Sprengel**

Common; on sandy soil, or rotten logs in open or woods. (11), (15), (16), (20), (22), (26), (27), (30), (31), (32), (33), (34), (35). In our area, this species generally contains atranorin and fumarprotocetraric acids. We found only one specimen containing atranorin alone.

***Cladonia cenotea* (Ach.) Schaer.**

Frequent; on wood, stumps, fence rails or mossy base of cedar. (13): 2021; (15): 3610; (27): 2393; (31): 3056; Brodo 16246; (32): 4009; (33): Wallace 542; (34): Brodo 22741; (35): Catling s.n.

***Cladonia cervicornis* (Ach.) Flotow** subsp. ***verticillata* (Hoffm.) Ahti.**

Very common, on soil, rotten wood, or over mosses on boulders; in open habitats. (4), (9), (10), (15), (21), (24), (26), (27), (29), (3O), (31), (32), (33), (34), (35).

***Cladonia chlorophaea* (Flörke *ex* Somm.) Sprengel**

Very common; on soil, wood, mossy bases of tree trunks, thin soil or mosses over rocks, in shade or open areas. (4), (9), (10), (13), (15), (17), (20), (24), (25), (26), (27), (29), (30), (31), (32), (33), (34), (35), (36). This species, one of the most abundant species in southern Ontario is extremely variable in morphology and ecology. Soredia range from almost farinose to granular and even appear corticate at bases of podetia in some specimens. Within the recent past there have been a number of papers clarifying, in part, the intricate chemistry of the *C. chlorophaea* complex. Strong reliance has been placed on chemistry in the taxonomy of the group, and various segregates have been sorted out based upon the particular substances which they contain. Fumarprotocetraric acid is regarded as an accessory substance. However, the presence or absence of the other substances has been used as a basis for recognizing four species: *C. grayi* with grayanic acid; *C. cryptochlorophaea* with cryptochlorophaeic acid; *C.merochlorophaea* with merochlorophaeic and 4-O-methylcryptochlorophaeic acids; *C.chlorophaea* sens. str. with none of these chemicals. Recent experimental evidence has shown that, at least in North Carolina, some of these chemotypes represent interbreeding populations and others do not (Culberson et al. 1988). We feel it is still premature to reflect these important findings into a revised classification of the chemotypes.

***Cladonia coniocraea* auct.**

Very common; on rotting wood, fence, trees bases, humus or rocks, usually over mosses in often shaded areas. (3), (4), (13), (15), (19), (20), (21), (25), (26), (27), (29), (30), (31), (32), (33), (34), (35), (36). This is one of the most common species in southern Ontario,

perhaps because it can grow on highly polluted soil (LeBlanc 1969). It is most perhaps the morphologically variable among the *Cladoniae*. Podetia grow from the upper side of broad primary squamules, becoming 4-25 mm tall and 1-1.5 mm thick, markedly tapering, either subulate or with tiny cups at the tips with the interior of the cups having soredia. Normally, only a small part of the base is corticate and the farinose soredia forms greenish powder over the remainder (more rarely whitish or yellowish). According to Ahti (1980), both *Cladonia coniocraea* and *C. ochrochlora* seem to be based on material traditionally referrable to *C. ochrochlora*. Because some older, related taxa have not yet been typified, he proposed that the names *C. coniocraea* auct. and *C. ochrochlora* Flörke should be used in their traditional sense.

***Cladonia cornuta* (L.) Hoffm.**

Rare; on rotten wood, logs or sandy soil in unshaded field. (31): 3044; (33): Wallace 952; (34): Macoun 376.

***Cladonia crispata* (Ach.) Flotow**

Common; on stumps, rotting logs, fence posts, soil or in mosses over boulders, usually in unshaded situations. (4), (13), (14), (25), (26), (29), (30), (31), (33), (34), (35). The southern Ontario material is variable in size and shape. On rotting wood, the podetia are short, not more than 20 mm tall; on mossy soil where moisture is usually abundant, the podetia become taller (up to 40 mm) and more branched. Sometimes this species is easily confused with *C. squamosa* (in both morphology and chemistry), but the decorticate parts of the podetia of *C. squamosa* always retain the inner part of the medullary layer and shows an arachnoid appearance unlike the smooth appearance of the decorticate parts of the *C. crispata*.

***Cladonia cristatella* Tuck.**

Very common; on soil, stumps, rotten wood, fence posts, twigs of cedar or over rocks, usually in open situations. (4), (5), (9), (13), (15), (19), (20), (21), (22), (24), (26), (27), (29), (30), (31), (32), (33), (34), (35).

***Cladonia cryptochlorophaea* Asah.**

Infrequent; on soil, or in mosses over boulders, mostly found in open field or partly shaded situations. (9): 2681; (22): Cain 27118; (31): 3769; (33): Wallace 575C; (34) Grimm s.n. This species and its relationship to *C. chlorophaea* is discussed with the latter.

***Cladonia cylindrica* (Evans) Evans**

Infrequent; on stumps, logs, fence posts, conifers or soil in open. (9): Smocovitis 63; (26): 3115; (27): 2392; (33): 3258, 3377, Wallace 663; (34): Brodo 18757, 23533. Morphologically, this species is similar to *C. coniocraea* auct. Both have rather short, sorediate, usually sterile podetia and both are PD+ red. However, *C. cylindrica* has a clear gradation of coarse granules at the podetial base to farinose soredia at its tip and contains grayanic acid, whereas *C. coniocraea* is entirely covered with farinose soredia and lacks greyanic acid. *Cladonia cylindrica* can also resemble *C. macilenta.* when sterile. The two are best separated by their chemistry: *Cladonia macilenta* contains thamnolic acid (KOH+ yellow, PD+ yellow).

***Cladonia dahliana* H. Krist.**

Infrequent; on sandy soil, in moss over limestone outcrops or cliffs. (13): Erbisch 215; (14):1971; (29): Brodo 9675; (31): 3918; (34): Reddoch s.n. *Cladonia dahliana* was described from material lacking podetia (Kristinsson 1974). It differs from *C. symphycarpa* in containing psoromic acid. Most of the southern Ontario specimens have podetia. Morphologically, it is identical to *C. symphycarpa* and may be considered a psoromic acid race of that species (Ahti 1976).

***Cladonia decorticata* (Flörke) Sprengel**

Rare; on thin humus over granitic outcrops or in moss on fallen branches. (33): Wallace 46A, 393, 400A, 825. This species, widely distributed in the boreal region, produces abundant, subulate, whitish grey podetia with very small squamules on a decorticate surface. It is chemically distinctive, being entirely PD- and KOH- and producing perlatolic acid.

***Cladonia deformis* (L.) Hoffm.**

Rare; on soil, old logs or thin soil over granitic boulders. (21): 1890; (33): 309; (34): Macoun 2525. This species, uncommon in southern Ontario, is very similar to *C. sulphurina* (not found in southern Ontario), differing in having zeorin instead of squamatic acid and tending to have broader, shorter cups with less frequent longitudinal splits.

***Cladonia digitata* (L.) Hoffm.**

Rare; in moss over rotten log. (33): Ward 317; (35): Brodo 9592.

***Cladonia dimorphoclada* Robb.**

Very rare; two specimens from the same site. (29): 290A, Brodo 9712. This is a species of the eastern deciduous forest and is endemic to North America (Ahti 1973). The southern Ontario records are considerable extensions northward. It resembles a rather slender *C. uncialis* but has cartilaginous strands on the inner surface of the hollow podetia, and always lacks squamatic acid. After being stored for a number of years, the tips of the branches develop a "fuzz" of slender, white, needle-like crystals, probably diterpenes (Ahti 1973).

***Cladonia fimbriata* (L.) Fr.**

Common; on stumps, mossy bases of trees, wood, fence rails, soil or in moss over boulders, in either open or shaded situations. (10), (13), (15), (16), (19), (20), (25), (26), (27), (29), (31), (32), (33), (34), (35).

***Cladonia furcata* (Hudson) Schrad.**

Common; on soil, moss mats or thin soil over boulders in forests, open fields or bogs. (2), (4), (6), (10), (12), (19), (20), (26), (27), (29), (30), (33), (34).

***Cladonia gracilis* (L.) Willd.** subsp. ***turbinata* (Ach.) Ahti**

Common; on soil, stumps, rotten wood, mossy bases of trees or in moss over boulders, usually in exposed areas. (4), (5), (13), (16), (20), (21), (24), (26), (27), (30), (31), (32), (33), (34), (35). This is the only subspecies of *C. gracilis* found in southern Ontario. It is easy to recognize by its short (1-4 cm tall), stout, usually somewhat squamulose podetia with relatively wide (4-8 mm) cups often branching from the margins.

***Cladonia grayi* Merr. *ex* Sandst.**

Frequent; on humus, stumps, rotten wood, mossy bases of trees, thin soil or in moss over boulders, in forests or open fields. (4), (9), (21) (22), (25), (31), (32), (33), (34). The relationship of this species to *C. chlorophaea* is discussed with the latter. Most of the specimens from southern Ontario contain both grayanic and fumarprotocetraric acids (PD+ red), but a few of them have grayanic acid alone (PD-).

***Cladonia humilis* (With.) Laundon**

Frequent; on soil, stumps, rotten wood or in moss, usually in exposed areas. (15), (16), (19), (26), (27), (28), (33), (34), (35). The cups of this species resemble those of *C. fimbriata* in having farinose soredia but unlike the latter, the podetia are corticate on the lower half. Sometimes, the soredia become granulose like that of *C. chlorophaea*. The presence of bourgeanic acid in *C. humilis*, however, easily separates it from other two species, which lack it. *Cladonia humilis* consists of two differing chemotypes: one (including the Dillenian type specimen) containing fumarprotocetraric and atranorin, and the other containing fumarprotocetraric and bourgeanic acid. Typified according to Ahti (1966 and 1980), the

bourgeanic acid race could be called *Cladonia conista* (Nyl.) Robb. *in* Allen, although this is disputed by Laundon (1984). Since the two chemotypes are now regarded to be conspecific, this nomenclatural difficulty is a moot point.

***Cladonia macilenta* Hoffm.**

Common; on stumps, wood, fence posts, bases of trees, soil or in moss over rocks. (13), (14), (21), (22), (25), (27), (29), (31), (32), (33), (34), (36).

***Cladonia magyarica* Vainio**

Infrequent; on soil, or in moss over boulders, usually in open fields. (3): Foster 202; (27): 2386; (29): 2437, 2471, Brodo 9676; (31): 2974, 3020; (33): 2319; (34): 1792, 2796. This species is closely related to *C. pyxidata* (L.) Hoffm. and *C. pocillum* (Ach.) O. Rich.. They all grow in exposed habitats. *Cladonia magyarica* differs from both these species in being greyer and in producing atranorin besides fumarprotocetraric acid (Brodo 1988). The basal squamules of *C. magyarica* are thick and crowded, and the podetia are short and goblet-shaped often having squamules on the interior and edges of the cups.

***Cladonia merochlorophaea* Asah.**

Rare; on dry lignum or on soil over rocks, in woods or in the open. (27): Brodo 27603; (33): Wallace 417; (34): Macoun 142. The relationship between this species and *C. chlorophaea* s. lato is discussed with the latter.

***Cladonia multiformis* Merr.**

Frequent; on soil or rotten wood, in open fields. (11), (14), (20), (26), (29), (31), (32), (33), (34). This species shows considerable morphological variation, but apparently none correlating with specific ecological situations. The sieve-like perforated membranes of the cups (or the axils) forms the most characteristic feature of the species. In one form podetia produce distinct cups that flare rapidly. The margins of the cups often proliferate and sometimes develop into secondary ranks of cups. In another form, podetia have very few cups and produce irregular branches.

***Cladonia parasitica* (Hoffm.) Hoffm.**

Rare; on stumps, rotten logs or fence rails, usually in shaded areas, but also found in open situations. (31): Brodo 23434; (33): Wallace 380, 672C; (34): 2847, Brodo 24950, Shchepanek 6B. This species can be recognized even in the field by its fine granules (sometimes appear to be granular soredia) on the tiny podetia. The presence of thamnolic acid is another confirmation of the species.

***Cladonia peziziformis* (With.) Laundon**

Infrequent; on sandy soil, decaying wood, stumps or peat, in well light areas. (3): Macoun 3740; (4): Stewart 228; (10): Cain 3728, 18772 (TRTC) (24): Macoun 2086, 2329; (34): Macoun 2084. This species has long been known as *Cladonia capitata* (Michx.) Sprengel

***Cladonia phyllophora* Ehrh. *ex* Hoffm.**

Common; on soil, dead twigs, in peat or moss over boulders, usually in open fields. (4), (9), (13), (15), (21), (25), (27), (29), (31), (32), (33), (34). *Cladonia phyllophora* is sometimes difficult to distinguish from *C. gracilis* ssp. *turbinata*. Its podetia are dull or even more or less subtomentose rather than smooth and shiny, and the base has whitish spots of cortex distributed over a black background rather than having a uniformly corticate base. *Cladonia phyllophora* may also be confused with *C. multiformis*,, but have more irregular cups, and more frequently produce squamules on the cup margins. *Cladonia multiformis*, like *C. gracilis*, also has a smoother cortex. Compared with northern material, *C. phyllophora* from southern Ontario has wider cups and shorter podetia.

***Cladonia pleurota* (Flörke) Schaer.**

Frequent; on soil, in peat, or in moss over boulders, often in exposed areas. (2): Allen s.n.; (22): 3655; (25): 3736; (26): Case 8166, 8167, 8235 & 8250; (32): Brodo 18743; (33): 2318, Wallace 422, 558, 582, 644, 711 & 722; (34): Brodo 13314, 14608 & 14611. When the red apothecia or pycnidia are absent and the usnic acid content is low (as in shade forms), *C. pleurota* will resemble a small yellowish *C. chlorophaea*.

***Cladonia pocillum* (Ach.) O. Rich.**

Frequent; on sandy soil or in moss over boulders, in the open. (13), (16), (17), (20), (25), (29), (30), (31), (34). This species, with small peltate squamules covering the podetia, is very closely related to *C. pyxidata* which, however, is always grey-green instead of brown. In addition, *C. pyxidata* has separate, ascending primary squamules, while *C. pocillum* has subfoliose rosettes of rather adpressed primary squamules (see also comment under *C. magyarica*).

***Cladonia polycarpoides* Nyl. in Zwackh**

Very rare; on soil. (19): Macdonald 5012. The presence of norstictic acid in this species separates it from similar species which lack it, such as *C. peziziformis*. *Cladonia symphycarpa*, another terricolous species also containing norstictic acid, has larger, thinner squamules and produces atranorin in addition.

***Cladonia pyxidata* (L.) Hoffm.**

Very common; on soil, stumps, bases of trees, in moss over boulders, mostly in exposed, dry fields but also found in forests. (9), (12), (13), (14), (15), (16), (19), (20), (21), (25), (27), (29), (30), (31), (32), (33), (34), (35), (36). This species is one of the most common *Cladoniae* in southern Ontario. It resembles *C. pocillum* and *C. magyarica* (see both species above). *Cladonia pyxidata* may tolerate more shade and wetter habitats than the other two.

***Cladonia ramulosa* (With.) Laundon**

Infrequent; on stumps or dead trees, in open or in forests. (19): Macoun 2173; (20): Cain 21498 (TRTC); (21): 3541; (34): Macoun 147. The species has been known as *Cladonia anomaea* (Ach.) P. James and *C. pityrea* (Flörke) Fr. It's nomenclature is discussed by Ahti (1980) and Laundon (1984).

***Cladonia rei* Schaer.**

Very common; on soil, stumps, rotten wood or in moss over boulders, in exposed or shaded areas. (9), (13), (14), (15), (16), (17), (19), (20), (26), (27), (28), (29), (30), (31), (33), (34), (35), (36). The southern Ontario material always contains homosekikaic acid, about 50% also has fumarprotocetraric and protoceraric acids.

***Cladonia scabriuscula* (Del.) Nyl.**

Rare; on soil, rotten wood, twigs or roots of conifer trees, usually in conifer forests. (13): 2053, 2166, Johnson 11; (31): Brodo 16269; (32): Brodo 18736; (34): Brodo 14615.

***Cladonia squamosa* (Scop.) Hoffm.**

Common; on stumps, fence, rotten wood, mossy bases of conifer trees, or in moss over rocks or cliffs, often in shade, but also in the open. (4), (13), (15), (25), (27), (30), (31), (32), (33), (34).

***Cladonia subulata* (L.) Wigg.**

Rare; on soil or in moss over boulders, usually in open habitats. (26): 3119; (27): 4293; (34): 2819; (36): 3097. This species has a distinctly northern distribution. In Canada, it has been reported from Alberta, British Columbia, Quebec, the Northwest Territories and northern Ontario. It has been found only in the northeastern parts of southern Ontario and appears to be at its southern limit of its distribution there.

***Cladonia symphycarpa* (Ach.) Fr.**

Rare; on soil or over limestone in open fields. (27): 2383; (31): 4115; (33): Wallace 523; (34): Gillett 541. This species and its relationship to *C. dahliana* is discussed with the latter. It is probably much more common than would be indicated by the few collections because it usually is sterile (i.e., without podetia) and therefore overlooked.

***Cladonia turgida* Ehrh. *ex* Hoffm.**

Common; on soil, or in moss and litter over boulders, in forests or in open areas. (13), (21), (25), (27), (29), (31), (32), (33), (34).

***Cladonia uncialis* (L.) Wigg.**

Frequent; on soil, or in moss over boulders, usually in well lighted situations. (3), (21), (25), (26), (27), (29), (31), (33), (34).

Collema bachmanianum* (Fink) Degel.** var. ***bachmanianum

Frequent; on soil, limestone rocks or cliffs, or mossy bases of trees. (20): Cain 22780, 25721 (TRTC); (24): Macoun 1449; (25): 4455; (27): Cain 26944, Macoun 1444, 1460; (31): 1390; (34): Brodo 22785, 22800, 27394. In dry habitats, the lobes of *C. bachmanianum* tend to be short, with abundant apothecia. In wet habitats, the lobes are longer and better developed, sometimes with numerous accessory lobes. Sterile specimens may be difficult to separate from *C. tenax*.

***Collema bachmanianum* (Fink) Degel.** var. ***millegranum* Degel.**

Rare; on limestone rocks or cliffs. (27): 4343, Cain 26944 (TRTC). This variety is distinguished from the non-isidiate main type in possessing numerous small to rather large, more or less globular isidia on the thallus; it is often sterile.

***Collema coccophorum* Tuck.**

Rare; in mosses over cliffs on water line. (31): 3936; (34): Brodo 22803. This species is similar to *C. bachmanianum* var. *millegranum* but has a smaller thallus and the spores are 2-celled instead of submuriform.

***Collema furfuraceum* (Arn.) Du Rietz**

Very rare; on a granitic cliff. (30): 254 (Brodo: Lich. Canad. Exs. no. 174).

***Collema fuscovirens* (With.) Laundon** (Syn. *C. tuniforme* (Ach.) Ach. em Degel.)

Frequent; on calcareous rocks, rarely on granitic rocks, or periodically inundated in water containing calcium. (13), (14), (25), (27), (29), (30), (31), (33), (34). *Collema fuscovirens* is one of the most common species of the genus in southern Ontario. It may be confused with *C. subflaccidum*, occurring on bark or granitic rocks, which has similar but smaller isidia.

***Collema limosum* (Ach.) Ach.**

Rare; on sandy soil or in moss over limestone cliffs, usually on roadsides or in more or less open situations. (30): Brodo 23539; (34): Brodo 22802A, Darbyshire s.n..

***Collema nigrescens* (Hudson) DC.**

Rare; on tree trunks. (24): Macoun 1410; (27): Macoun 51. This species is easily recognized by its densely pustulate and ridged thallus having lobulose to more or less flattened isidia, and by its very numerous and dense apothecia. *Collema furfuraceum*, which also has a ridged, pustulate thallus, has cylindrical isidia, and rarely produces apothecia.

***Collema polycarpon* Hoffm.**

Rare; on bare limestone or cliffs. (19): Cain 25796 (TRTC); (34): 1567.

***Collema subflaccidum* Dugel.**

Rare; on bark (mainly deciduous trees) or granitic cliffs. (24): Macoun 1467; (30): 335. This species' similarity to *C. fuscovirens* has already been mentioned. *Collema subflaccidum* is common elsewhere in eastern Canada (including the Ottawa region), and may well be more

widespread in southern Ontario than currently thought. It undoubtedly has suffered from the destruction of the old growth deciduous forests in southern Ontario, which are its preferred habitats.

***Collema tenax* (Sw.) Ach.**

Frequent; on soil, or in moss over wood, rocks or cliffs, usually calcareous; in the open or in forests. (3), (16), (17), (25), (27), (29), (31), (33), (34). This species' similarity to *C. bachmanianum* has already been mentioned.

***Conotrema urceolatum* (Ach.) Tuck.**

Rare; almost exclusively on the bark of *Acer saccharum*, more rarely *Populus* or other deciduous trees; in old, shaded forests. (24): Macoun 1970; (27): Macoun 3004; (31): 3793, 4235; (34): Macoun 4146. This species forms conspicuous white patches on tree trunks in old growth sugar maple forests. It is among the most substrate specific lichens.

****Cryptolechia carneolutea* (Turn.) Massal.**

Very rare; on the bark of a maple tree. (26): 3141.

Cyphelium (See key to Caliciales.)

****Cyphelium notarisii* (Tul.) Blomb. & Forss.**

Very rare; on a fence post. (14): 1930.

***Cyphelium tigillare* (Ach.) Ach.**

Infrequent; on very dry, hard lignum (fence posts, stumps, dead trees) rarely bark of conifers, usually in open situations especially near streams or lakes. (3): 1635, 1664; (5): 1707; (19): 2593; (27): 279; (28): Brodo 9689; (34): Brodo 17097, 17098A, 25286; (36): 1234.

***Dermatocarpon luridum* (With.) Laundon** (Syn. *D. weberi* (Ach.) Mann; *D. fluviatile* (G. Web.) Th. Fr.)

Frequent; on calcareous or non-calcareous rocks in or near water. (13): 2081, 2088; (21): 25243 (TRTC); (25): 3764; (31): Townsend 26584; (32): Cain 25723 (TRTC); (33): 3351, Brodo 9653; (34): Brodo 22780.

***Dermatocarpon miniatum* (L.) Mann**

Infrequent; on granitic or calcareous rocks, usually in the crevices of large boulders or cliffs at roadsides or along lakeshores in the open. (13): Cain 26507 (TRTC), Johnson s.n.; (25): 3757; (27): 2272, Macdonald 5256; (31): Rygiel s.n.; (33): 241, 2321, 3345, 3401, Billings s.n.

***Dimelaena oreina* (Ach.) Norm.**

Infrequent; on granitic rocks in the open. (27): Macoun 1876; (29): 4286, Brodo 27571; (31): Brodo 20278; (33): 316, 3419, 3464, 3480. In southern Ontario, this species is narrowly restricted to granitic rock with quartz-dominated surfaces on ridge tops. Sheard (1977) reported that *D. oreina* consists of six chemotypes. In southern Ontario, we found only chemotypes I (fumarprotocetraric, protocetraric and usnic) and II (gyrophoric and usnic), each about equally common.

***Dimerella lutea* (Dickson) Trev.**

Infrequent; on bark of conifers in forests. (20): Cain 25981 (TRTC); (21): Krug 224B; (27) Brodo 27621; (34): Macoun 251.

***Dimerella pineti* (Schrader *ex* Ach.) Vězda** (Syn. *Dimerella diluta* (Pers.) Trev.)

Infrequent; on moss over wood or on rotten logs in woods. (10): Cain 25799 (TRTC); (31): Ley s.n.; (33): Brodo 25503; (34): Macoun s.n., 195.

****Diploschistes muscorum* (Scop.) R. Sant. subsp. *muscorum***

Infrequent; over soil, mosses or other lichens, especially *Cladonia*, and occasionally on rocks, mainly calcareous. (27): 2391, 4311; (31): 1841, 3057, 3876; (33): 396, 2303, 3502. This

species is distinguished from the more common *D. scruposus* on the basis of its substrate and constantly 4-spored asci (Lumbsch 1989)

***Diploschistes scruposus* (Schreb.) Norm.**

Frequent; on granitic boulders, and cliffs, in the open or in shade. (25), (29), (30), (31), (32), (33), (34).

****Diplotomma epipolium* (Ach.) Arn.**

Rare; on limestone or at least very weak calcareous rock cliffs, in shade. (19): 2580; (31): 1379, 1387.

***Endocarpon pusillum* Hedw.**

Common; on calcareous rocks, on moss or soil over limestone, in open or in forests. (14), (15), (16), (17), (21), (27), (28), (29), (31), (33), (34). It is curious, that this almost exclusively saxicolous species was collected a number of times in the Montreal (Quebec) area on the bases of elm trees. If this is related to pollution stress, the phenomena should be watched for in southern Ontario.

***Eopyrenula leucoplaca* (Wallr.) R. Harris**

Infrequent; on deciduous tree bark, mostly on *Acer saccharum*, in forests. (27): Macoun 3049; (31): 3945, 3946; (34): Macoun 420 (TRTC), 576, 3252 (CANL); (35): Macoun 273 (TRTC). The relationship between this species and *Pyrenula, Arthopyrenia faginea (=Strigula stigmatella)* and *Blastodesmia* had been discussed in detail by Harris (1973).

****Ephebe lanata* (L.) Vainio.**

Very rare; on HCl+ sandstone at stream edge. (25): 4427. This species is usually found on non-calcareous rock., making our material ecologically aberrant.

***Evernia mesomorpha* Nyl.**

Common; on trees of all kinds (mainly conifers), or on wood. (13), (14), (15), (16), (20), (24), (25), (27),

***Evernia prunastri* (L.) Ach.**

Very rare; or more likely extirpated; substrate unknown. (27): Macoun 335. The only specimen was collected by Macoun in July, 1874, from the Belleville area according to the packet. It is a good specimen, typical in all respects, with clearly dorsiventral lobes and marginal soredia. Even if it was not mislabelled, the specimen represents an outlier. Its main distribution in North America is along the west coast, with some disjunct localities on the east coast (Bird 1974) and scattered boreal occurrences in the northern Great Lakes region (Hale 1979).

***Flavoparmelia baltimorensis* (Gyelnik & Fór.) Hale**

Rare; on granitic boulders, less frequently on trees. (27): Drummond s.n.; (33): 3327, 3465, 3472, 3493, Brodo 23432A. The southern Ontario specimens are at the northern limit of the range of the species, although it was reported from northern Minnesota by Wetmore (1981). The relationship between this species and *F. caperata* is discussed by Culberson and Culberson (1982) with respect to their habitat and possible evolutionary development.

***Flavoparmelia caperata* (L.) Hale**

Very common; on trees of all kinds, lignum and rocks, in shaded or open habitats. (3), (4), (5), (10), (12), (13), (15), (16), (17), (19), (20), (21), (22), (24), (25), (27), (30), (31), (32), (33), (34).

***Flavopunctelia flaventior* (Stirton) Hale**

Common; on trees of all kinds, lignum in forests or open areas. (5), (6), (9),(19), (24), (27), (28), (29), (33), (34), (36).

***Flavopunctelia soredica* (Nyl.) Hale**

Rare; on deciduous trees in swampy areas. (9): 2636; (34): Brodo 16415A.

***Fuscidea recensa* (Stirton) Hertel, V. Wirth & Vězda**

Very rare; on a granitic cliff. (33): 435. This is the only species of the genus found in southern Ontario. The bean-shaped or bone-shaped (slightly constricted) spores is the distinctive character of the *F. cyathoides* group, including *F. recensa*. The species is very polymorphic, however, and we believe the eastern American material may represent several non-sorediate taxa that contain divaricatic acid. We are using the name in the broad sense here. The species is discussed by Brodo (1984a) in relation to *Lecidea arcuatula* (Arnold) Hue, and by Oberhollenzer and Wirth (1984, 1990) in relation to *F. curvula* (H. Magn.) Hertel. In both cases, it is pointed out that differences in thallus colour do not seem to distinguish the taxa. The presence of soredia also appears to be variable (Oberhollenzer and Wirth 1990).

***Graphis scripta* (L.) Ach.**

Very common; on trees of all kinds, but more often on deciduous trees. (3), (4), (6), (10), (13), (14), (15), (16), (19), (20), (21), (24), (27), (29), (30), (31), (32), (33), (34), (35). This is one of the most common corticolous crustose species in southern Ontario. The apothecia are polymorphic, depending on the grain of the bark substrate.

****Gyalecta truncigena* (Ach.) Hepp**

Very rare; on *Populus*. (34): Brodo 27627.

Haematomma (see *Loxospora*)

***Heterodermia hypoleuca* (Mühl.) Trev.**

Rare; on trees, sometimes on moss over trunks. (24): Macoun 796; (33): Billings s.n.. The absence of soredia of this species makes it very easy to separate from the other species of the genus.

***Heterodermia obscurata* (Nyl.) Trev.**

Very rare; on a tree trunk over moss. (34): Macoun 54. This specimen was discovered in the CANL packet of Macoun's "Can. Lich. no. 54" by Sharon Gowan and was correctly named by her. It was growing mixed with *Pannaria ahlneri* and, like the latter, is out of its range (see discussion under *Pannaria ahlneri*). It was, however, recorded from the east shore of Lake Michigan by Wetmore (1988).

***Heterodermia speciosa* (Wulfen) Trev.**

Infrequent; on deciduous trees, fence rails, or boulders in forests or swampy areas. (16): Cain 25166 (TRTC); (24): Macoun 791; (27): 4506; (31): Cain 27049 (TRTC); (34): Macoun 54, 305 (CANL), 296 (TRTC).

****Hymenelia lacustris* (With.) Poelt & Vězda**

Rare; on granitic boulders. (25): 4411; (29): Brodo 27572. See comments under "*Ionaspis odora* sensu N. American auct."

***Hyperphyscia adglutinata* (Flörke) Mayrh. & Poelt**

Frequent; on deciduous trees, or fence posts, at roadsides, in open fields or in forests. (10), (14), (15), (20), (22), (33), (34), (36).

***Hypocenomyce anthracophila* (Nyl.) P. James & G. Schneider**

Rare; on charred stumps or trunks. (29): Brodo 27574; (31): Brodo 25216.

***Hypocenomyce friesii* (Ach.) P. James & G. Schneider**

Infrequent; on charred stumps in open. (21): 1878; (31): Cain 27153; (32): Brodo 14589; (34): Brodo 22751B, 23534, 24952.

***Hypocenomyce scalaris* (Ach.) Choisy**

Very common; on charred stumps, wood, fence posts or bark of various trees, often in open fields, at roadsides, or in forests. (1), (3), (4), (9), (14), (15), (19), (21), (22), (27), (29), (31), (33), (34), (36).

***Hypogymnia physodes* (L.) Nyl.**

Very common; on trees of all kinds but especially conifer branches, fence rails, or mossy rocks in forests, open fields or roadsides. (4), (10), (13), (14), (15), (16), (19), (21), (24), (27), (28), (30), (31), (33), (34), (34), (35).

***Icmadophila ericetorum* (L.) Zahlbr.**

Very rare; over peat in a bog. (27): Macoun 475 (TRTC). This boreal species is widely distributed in northern Ontario, but the southern Ontario record appears to be at the southern limit of this species. With its large, pink apothecia on a pale green, continuous crust, it is easily recognized in the field. The spores are fusiform and 1-3-septate.

***Imshaugia aleurites* (Ach.) S.F. Meyer**

Frequent; on fence posts, logs, stumps or dead conifer trees. (21): 1902; (27): 2395; (29): 2477; (31): 3889; (33): Brodo 9642; (34): Brodo 16281, 18754, 24950, Shchepanek 145.

****Ionaspis epulotica* (Ach.) Blomb. & Forss.**

Very rare; on limestone on a rocky shore. Specimen verified by F. Lutzoni. (13): 2120.

***Ionaspis odora* sensu N. American auct. non (Ach.) Th. Fr. *ex* B. Stein.**

Very rare; on granitic boulers. (30): 2895. This species, often named as "*Ionaspis odora*" by North American authors, actually represents a distinct species. It will be classified, together with *Hymenelia lacustris* and related species, in a new genus to be described by Lutzoni and Brodo (in preparation). The species description and revisions of other species in the *Hymenelia-Ionaspis* complex will appear in separate papers by Lutzoni (in preparation).

***Julella fallaciosa* (Stizenb. *ex* Arn.) R. Harris**

Frequent; on bark of deciduous trees, mainly on *Acer*. (25): 4412; (30): Brodo 9664; (31): 4231, Brodo 25230; (33): 3477; (34): 4356, Brunton s.n., Haber 3151. In addition, Harris (1973) cited the following specimens from southern Ontario: (21): Brodo 9664 (MSC), Imshaug 26943, 26971, 26997 (MSC); (34): Macoun 5 Jan. 1907 (FH). This species has a non-lichenized thallus.

***Kirschsteiniothelia aethiops* (Berk. & Curtis) D. Hawksw.** (Syn. *Microthelia micula* Körber)

Rare; on stumps or fallen trunks. (31): 3840, 3848, 3851. This is a non-lichenized fungus according to Santesson (1984). It has been reported from the Algoma District in northern Ontario (Harris 1973) (sub *Microthelia micula*), but is apparently new to southern Ontario. The genus is treated in Hawksworth (1985a, 1985b).

***Lasallia papulosa* (Ach.) Llano**

Infrequent; on exposed granitic rock cliffs or boulders, mainly in Canadian Shield area. (23): Cain 18796; (27): Cain 26927 (TRTC); Drummond 14; (29): 4201; (31): Vogg s.n.; (33): 317, 3304, 3504, Billings s.n.

****Lecanactis chloroconia* Tuck.** (See key to *Bacidia*.)

Rare; on *Thuja* in swampy areas. (31): 3815, 3860; (32): 4015; (34): 4518.

***Lecania cyrtellina* (Nyl.) Sandst.**

Infrequent; on bark of deciduous trees. (25): 2216 (Brodo: Lich. Can. Exs. no. 182); (27): Macoun 2989; (29): 855A; (31): 3940; (34): Macoun 25, 220, 391, 1794. This species has been discussed in detail by Brodo (1984a). Although most of the spores are under 4 μm broad, some may be up to 5 μm. The colour of the apothecia is also variable, ranging from pale yellowish orange to dark red brown. There is still a question as to whether all our

specimens belong to this species or whether some are better classified as *L. cyrtella* (Ach.) Th. Fr.

***Lecania dubitans* (Nyl.) Sandst.**

Very rare; on poplar bark. (34): collector unknown 2789.

***Lecania* sp.**

Only one specimen was collected, on shoreline limestone. (33): 3431. Perhaps this is sp. #2 sensu Harris 1977, or it may belong to *L. erysibe* group.

***Lecanora allophana* Nyl.**

Rare; on deciduous trees. (27): Macoun 106; (31): Brodo 25221; (34): Macoun 1711, 1712; (35): Macoun 85.

***Lecanora argentata* (Ach.) Malme**

Rare; on deciduous trees. (4): Stewart 415; (13): 2143; (15): 3608.

Lecanora caesiorubella* Ach. subsp. *caesiorubella

Frequent; on trees of all kinds. (19): Macoun 3729; (27): Macoun 1691, 1692, 1818; (30): 2951; (31): 3786, Brodo 16255; (32): 3221, Brodo 14565; (34): Macoun 251, 1690; (35): collector unknown.

***Lecanora cenisia* Ach.**

Very rare; on non-calcareous rock. (34): collector unknown 3616. This specimen was growing side by side with *L. rupicola* which is also very rare in southern Ontario. The specimen of *L. cenisia* belongs to the roccellic acid race (see Brodo 1984b).

***Lecanora chlorophaeodes* Nyl. s. lato**

Very rare; on granitic boulders in deciduous forests, or in the open. (31): 3899. See also the discussion under *Lecanora weberi*. Its distribution in North America is unknown.

***Lecanora cinereofusca* H. Magn.**

Rare; on bark of deciduous trees. (5): 1702A; (16): White 1728. This is an Appalachian-Great Lakes species of the deciduous forests.

***Lecanora crenulata* Hook.**

Rare; on limestone. (13): 2048, 2090, 2094.

***Lecanora dispersa* (Pers.) Somm.**

Common; on limestone, mostly in open areas. (4), (13), (15), (17), (19), (27), (28), (30), (31), (33), (34), (36).

***Lecanora glabrata* (Ach.) Malme**

Frequent; on deciduous trees, mainly *Acer saccharum* or *Fagus*. (13), (14), (26), (29), (30), (31), (32), (34).

***Lecanora hagenii* (Ach.) Ach.**

Common; on fence rails, stumps or deciduous trees. (3), (9), (14), (17), (22), (24), (25), (27), (30), (33), (34). This species is distinguished from *L. saligna* by its pruinose disks and greyish rather than yellowish apothecial margins.

***Lecanora hybocarpa* (Tuck.) Brodo**

Common; on bark of deciduous trees. (4), (5), (14), (16), (21), (26), (27), (29), (30), (31), (32), (33), (34).

***Lecanora impudens* Degel.**

Common; on bark of all kinds, fence posts or rarely on calcareous rocks. (4), (9), (15), (19), (22), (25), (27), (29), (31), (32), (33), (34).

***Lecanora imshaugii* Brodo**

Rare; on bark of deciduous trees. (27): Macoun 106; (34): Macoun 345 (holotype), 347. This is an eastern America endemic, and although its main distribution is to the south, the type was selected from the southern Ontario material.

***Lecanora meridionalis* H. Magn.**

Infrequent; on Thuja, rarely on oak or fence rails, in open situations. (13): 2032, 2034, 2190; (24): Macoun 1697; (25): 3177, Muhle 1697; (27): 4348, 4500; (31): 3788, 3846; (32): 3986.

***Lecanora muralis* (Schreb.) Rabenh.**

Common; on calcareous or non-calcareous rocks, or, in one case, on the root of an oak; mostly in open areas. (4), (14), (25), (27), (28), (30), (31), (32), (33), (34), (36).
The"substrate switch" of *L. muralis*, normally saxicolous, to tree bases is remeniscent of the same switch seen with *Endocarpon pusillum* (see above) or *Flavoparmelia baltimorensis* (Culberson and Culberson 1982).

***Lecanora opiniconensis* Brodo**

Rare; on granitic boulders, in the open. (27): Brodo 27597; (30): Dawson s.n.; (33): Brodo 25117 (holotype), 23432B, 23543, 25507. This widely distributed but rare species was first discovered in southern Ontario (Brodo 1987). It is usually associated with lakeside cliffs and outcrops. The species is now known from southwestern U.S.A., the Great Lakes region, and the northern section of the Adirondack Mountains as far east as Maine.

***Lecanora pallida* (Schreb.) Rabenh.** var. ***rubescens* Imsh. & Brodo**

Frequent; on bark of all kinds, but more often on conifers. (13):2036; (21): 3543; (27): 4465, 4502, Brodo 27620B; (31): 3855, Brodo 25123, 25215; (32): 3985, 4000; (34): 3233.

***Lecanora perplexa* Brodo**

Rare; on *Acer* or calcareous rocks. (29): 4272; (35): collector unknown. This species, when saxicolous, is usually found on HCl- rocks (Brodo 1984b), but the southern Ontario material was collected from a calcareous rock. Corticolous specimens resemble *L. imshaugii* or *L. argentata*, differing from the former in having large amphithecial crystals, and the latter in having a thin, indistinct cortex. If on rock, it could be confused with *L. pseudistera*, but *L. perplexa* contains zeorin rather than galactinulin and the thalli is granulose rather than dispersed areolate.

***Lecanora piniperda* Körber**

Infrequent; on fence rails, or deciduous trees. (1): 1611; (5): 1714; (20): Cain 18743; (21): 3522, 3524; (27): 2379; (34): 1804, 1806.

***Lecanora polytropa* (Hoffm.) Rabenh.**

Frequent; on granitic boulders in open or shaded areas. (14): 1943; (27): 2228; (30): 2892; (31): 3028, 3802, 3917, 4065, 4074, 4198; (32): Brodo 14599; (33): 305, 3369; (34): 2837, Brodo 18767. Although most specimens of *L. polytropa* consist of nothing but masses of small, yellowish apothecia, a few produce scattered, tiny, yellowish areolae.

***Lecanora pseudistera* Nyl.**

Infrequent; on granitic boulders, usually in the open. (25): 3693, 3760, 4415; (30): Brodo 25124; (31): 1852, 1855, 2966; (33): 331, 351, 507, 509, Brodo 23433A; (34): 2810.

***Lecanora pulicaris* (Pers.) Ach.**

Common; on bark of all kinds or dead wood. (3), (13), (21), (25), (26), (27), (30), (31), (32), (34), (35), (36).

***Lecanora rugosella* Zahlbr.**

Frequent; on bark of various trees. (23): 2031, 2033, 2037, 2146, 2171; (15): 2201; (27): 2253; (30): 864; (31): 2869, 3806, 3825, 3857, Brodo 25213; (32): 3996, 4025; (34): 3232, Brodo 22744.

***Lecanora rupicola* (L.) Zahlbr.**

Very rare; on non-calcareous rocks. (34): [Macoun ?] 3616, 3644. This species is more commonly found in northern and western North America. The record is based on two specimens collected a century ago probably by John Macoun, from rocks near Hogs Back in Ottawa. We have searched the area in vain for this and other rare crustose lichens collected by Macoun (e.g., *Acarospora canadensis* and *Lecanora cenisia*). The disappearance of these species may be due to general air pollution or habitat destruction, although the site itself is still parkland (but very heavily used).

***Lecanora saligna* (Schrad.) Zahlbr.**

Common; on fence posts, stumps or deciduous trees. (3), (5), (6), (9), (14), (15), (19), (21), (22), (25), (27), (29), (34).

***Lecanora strobilina* (Sprengel) Kieff.**

Infrequent; on bark of various trees. (25): 3673, 4404; (26):4433; (30): 2916; (31): 4155; (33): 3461; (34): 1315B, 1334.

***Lecanora symmicta* (Ach.) Ach.** (See key to *Lecidea*.)

Common; on bark or twigs of various trees, or on fence posts in the open or in forests. (1), (3), (4), (5), (9), (12), (13), (15), (21), (25), (27), (29), (31), (34), (36).

***Lecanora thysanophora* R. Harris,** ined.

Frequent; on bark of various trees, rarely on non-calcareous rocks. (15), (25), (27), (30), (31), (32), (33), (34).

***Lecanora weberi* Ryan**

Rare; on granitic boulders in deciduous forests or on ridge tops. (25): 3720, 3745; (31): 1849, 3801. Ryan (1989) described this lobate *Lecanora* from western United States (Colorado, Idaho and South Dakota), and so these collections represent a considerable extension of the species' range. The range extension is similar to that of *L. opiniconensis*, but in reverse. *Lecanora weberi* can be confused with *L. chlorophaeodes* in the east. Both are yellowish lobate species producing usnic acid in the cortex. In fact, one of our specimens of *L. weberi* was misnamed as *L. chlorophaeodes*, leading us to comment that the apothecial disks of the latter can vary in colour and be either pruinose or epruinose (Wong and Brodo 1990). It turns out that morphology and chemistry of the material from southern Ontario correlate perfectly. We examined all the specimens of this complex, regardless of locality, and divided them into two groups based on the pruinosity of the apothecia: Group 1: pruinose, either (a) pale fruited (brownish), or (b) becoming greenish-black; and Group 2: epruinose and pale-fruited. In Group 1 (both a and b), all the specimens contained a series of low R_f fatty acids, apparently of the constipatic-pertusaric acid group. All the Group 2 (epruinose) material contained zeorin as well as fatty acids, especially one unidentified compound running R_f classes 4-5, 2-3, 3 in solvents A, B and C. (Some specimens had one or two extra fatty acids.) The constipatic-pertusaric group of fatty acids was absent. The *L. weberi* isotype falls into Group 1a and thus agrees with Ryan's description very well. The Group 2 material includes several Swedish specimens named as *L. chlorophaeodes* by various Europeans (including Vänskä). Thus, it would seem that *L. weberi* is distinct from *L. chlorophaeodes* and that both species occur in southern Ontario.

***Lecanora wisconsinensis* H. Magn.**

Rare; on bark of conifers. (15): 3589; (21): 3531; (31): 3834. Brodo (1984b) cited only one specimen (Macoun 53 [NY]) from southern Ontario (34). It is a species of the southern boreal forest.

***Lecidea* sensu Zahlbruckner**

1. On rock 2
1. On bark, wood, moss or soil 11

2. Thallus grey brown to brown, squamulose-areolate 3
2. Thallus grey to grey green, continuous, thin or thick, or thallus absent 4

3. Thallus cortex C+ pink (gyrophoric acid), medulla IKI-; thallus pale grey brown; apothecia to 1.5 mm broad . . . . . *Lecidea fuscoatra*
3. Thallus cortex and medulla C-, medulla IKI+ blue-black; thallus brown to dark brown; apothecia less than 1 mm broad, with no phenolic substances . *Lecidea brunneofusca*

4. Hypothecium hyaline to pale; epihymenium bluish green 5
4. Hypothecium brown to black 6

5. Thallus thin or thick, continuous to almost absent; apothecia sessile; medulla IKI-; spores 7.5-8 µm in width; paraphyses easily separable in water or at least in KOH. On calcareous rocks or rarely on granitic rocks; common . . . . *Lecidella stigmatea*
5. Thallus thick, areolate; medulla IKI+ blue; apothecia immersed between areolae, finally becoming sessile; spores 4.0-6.0 in width; paraphyses conglutinate in water. On granitic rocks; rare . . . . . *Lecidea tessellata*

6. Spores very large, (13.5-)15-19 x (6-)7-9 µm; apothecia large, 1-1.5 mm in diameter; exciple brown, or carbonaceous; some spores, especially young ones, have a gelatinous epispore or "halo" (best seen in an ink preparation). On granitic rocks . . . . . *Porpidia* (see key on page 64)
6. Spores smaller, 6-13(-15) x 2-5(-6) µm 7

7. Growing over moss on rock; spores 10-14 x 3.5-5 µm; hypothecium light to dark brown . . . . . *Mycobilimbia berengeriana*
7. Growing directly on rock 8

8. Epihymenium greenish black to blue-green 9
8. Epihymenium brown 10

9. Apothecia 0.5-1.5 mm in diameter; spores 7-13.5 x 3-4.5 µm; thallus thin, endolithic . . . . . *Lecidea auriculata*
9. Apothecia less than 0.4 mm in diameter; spores 6-8 x 2.5-4 µm; thallus thin to thick, epilithic . . . . . *Micarea erratica*

10. Spores 6-8 x 2.5-3.5 µm . . . . . *Lecidea chalybeiza*

10. Spores 11-15 x 5-6 μm ..... *Lecidea delincta*

11. Thallus consisting entirely of brownish green, dark brown or black round or isidioid granules; apothecia pale brown to black, with a dark brown hypothecium and exciple; spores (7.5-)10-15 x (3-)5-7.5 μm. On sandy or peaty soil or wood ..... *Placynthiella*
11. Thallus of grey green or yellow, at least partially continuous or verrucose. Over moss on bark or wood 12

12. Hypothecium brown 13
12. Hypothecium hyaline to pale 19

13. Thallus sorediate 14
13. Thallus not sorediate 15

14. Thallus grey green, verrucose, with some verrucae becoming sorediate; C+ pink (gyrophoric acid); spores 9-13.5 x 4-6 μm. On charred wood or on soil ... *Trapeliopsis*
14. Thallus greyish verrucose with dark green farinose soredia; C- (contains perlatolic acid); apothecia minute and clustered, 0.1-0.3 mm in diameter, blackish; spores 9-11.5 x 3-3.5 μm. On charred wood ..... *Biatora botryosa*

15. Epihymenium bluish green; hypothecium and inner exciple yellow brown, outer exciple greenish; spores broad, 6-8 μm in width 16
15. Epihymenium brown; spores narrower, 2-5 μm in width 17

16. Thallus containing xanthones (C+ orange if xanthone concentration is high); epihymenium granular or not; usually on *Populus* bark, sometimes on wood ..... *Lecidella elaeochroma*
16. Thallus lacking xanthones (always C-); epihymenium not granular; usually on acidic tree bark (e.g., oaks, maples, conifers) or lignum ..... *Lecidella euphorea*

17. Thallus lacking or reduced to a very thin olive green or grey green crust; paraphyses capitate, dark tipped; spores 6-8 x 2-3 μm. On lignum ..... *Lecidea plebeja*
17. Thallus present; spores 10-14 x 3.5-5 μm 18

18. Thallus of grey green, almost granular areoles; spores 10-14 x 3.5-5 μm. Over moss on trees or wood ..... *Mycobilimbia berengeriana*
18. Thallus grey to whitish green, very thin and continuous; spores 10-13.5 x 3.5-4.5 μm. On the bark of various trees ..... *Lecidea albofuscescens*

19. Apothecia dark brown to black 20
19. Apothecia yellow, orange brown, red brown, pallid brown or white 23

20. Apothecia under 0.4 mm in diameter, dark red-brown, marginless, usually flat (see couplet 25) ..... *Pyrrhospora varians*
20. Apothecia over 0.4 mm in diameter 21

21. Spores 10-16(-20) x 6.0-8.5(-10) μm 16

21. Spores less than 5.0 μm in width 22

22. Thallus thin, grey; apothecia brown to black, with a persistent thick to thin margin; spores 10-14 x 4-5 μm ..... *Lecidea erythrophaea*

22. Thallus well developed, greyish white; apothecia black, shiny, marginless in maturity; spores 7.5-10 x 3-4.5 μm ..... *Lecidea elabens*

23. Apothecia pale yellow, rarely white or greenish; thallus yellowish (usnic acid); spores 9-14 x 3-5 μm ..... *Lecanora symmictera*

23. Apothecia yellow brown, red brown or pallid to white (usnic acid absent) 24

24. Spores 9-12 x 2.5-4 μm; apothecia orange brown, 0.2-0.5 mm in diameter. On bark of trees ..... *Biatora helvola*

24. Spores 4-7 μm in width 25

25. Apothecia 0.4-1.0 mm in diameter, soon becoming hemispherical; thallus grey green, granulose, KC-, C-; spores narrowly ellipsoid 14-17(-22) x 4-6 μm. On moss or bark of *Thuja* ..... *Biatora vernalis*

25. Apothecia less than 0.4 mm in diameter, button-like and flat; thallus thin, yellow green to grey green, KC or C+ orange; spores broadly ellipsoid 10-13 x 5-7 μm. On bark of deciduous trees ..... *Pyrrhospora varians*

***Lecidea albofuscescens* Nyl.**

Very rare; on various trees. (34): Macoun 190. This species is easily confused with *M. berengeriana*, but instead of having a granular areolate thallus, it has a thin and continuous thallus. It grows directly on bark and *M. berengeriana* usually grows over mosses on rocks, trees, wood or soil.

***Lecidea auriculata* Th. Fr.**

Rare; on granitic boulders. (25): 3159B, 3686; 3762. The very small spores (7-13.5 x 3-4.5 μm, fide Lowe 1939), sparse to absent thallus and the brown hypothecium of this species distinguish it from other saxicolous *Lecideae* in the region. The presence of this arctic to northern boreal lichen in southern Ontario is surprising, although Peterborough County has other northern species.

***Lecidea brunneofusca* H. Magn.**

Rare; on granitic rocks in the open. (27): Brodo 27598; (33): 439. See comments under *L. fuscoatra*.

***Lecidea chalybeiza* Nyl.** (Syn. *Lecidea cyrtidia* Tuck.)

Very rare; on a rock. (10): Cain 3720 (TRTC). This species was discussed in Wong and Brodo (1990) as *L. cyrtidia*, having overlooked the synonymy mentioned in Hertel (1977).

***Lecidea delincta* Nyl.**

Infrequent; on granitic boulders in the open. (12): 2761; (25): 4409; (33): 328, 372, 456; (34): 1860; (36): 1785.

***Lecidea elabens* Fr.**

Infrequent; on wood or dead conifers. (22): 3647; (29): 4212; (31): 1839, 3891; (33): Brodo 9645.

Lecidea erratica (see *Micarea erratica*)

***Lecidea erythrophaea Flörke**

Rare; on beech trees. (4): 1743; (34): Macoun 2693.

***Lecidea fuscoatra* (L.) Ach.**

Rare; on a granitic boulder, in open field. (14): 1985. (30): Brodo 27569. This species is closely related to *L. brunneofusca*, but contains gyrophoric acid. In North America, it has been reported from California, Washington, Greenland, Alaska, British Columbia, Newfoundland, Quebec and northern Ontario. It is well known in Europe and is the type of the genus *Lecidea*. Thomson (in press) believes that all North American records are suspect.

***Lecidea plebeja Nyl.**

Rare; on rotten wood or stumps. (29): 4214; (33): 3379; (35): Wetmore 43687.
This is normally a species of the northern boreal forest, although it has been reported from Fundy National Park in New Brunswick (Gowan and Brodo 1988).

***Lecidea tessellata* Flörke**

Very rare; on granitic rock in open. (27): Brodo 27599. This arctic-alpine lichen is a remarkable find in our region, although the Bancroft area has other examples (e.g., *Lecanora rupicola, Rhizocarpon oederi*).

Lecidella (See key to *Lecidea*.)

***Lecidella elaeochroma* (Ach.) Choisy**

Rare; on lignum or acid barked trees, e.g., *Acer, Quercus* and *Juniperus*. (5): 1704A; (9): Macoun 2662.

***Lecidella euphorea (Flörke) Hertel**

Rare; on fence posts. (27): 2424; (33): 1285.

***Lecidella stigmatea* (Ach.) Hertel & Leuck.**

Very common; on calcareous or sometimes non-calcareous rocks, in open or shaded areas. (4), (10), (12), (13), (14), (17), (24), (25), (26), (27), (28), (29), (30), (31), (32), (33), (34), (36). This species is one of the most common saxicolous species in southern Ontario.

***Lempholemma myriococcum* (Ach.) Th. Fr.**

Rare; among mosses on rocks or tree trunks in woods. (34): Macoun 72, 103, 107. The small, foliose, dark green-black, membranous thallus resembles *Collema*, and sometimes covers several square centimeters. The simple spores, however, distinguish *Lempholemma* from *Collema*.

***Cfr. Lempholemma* sp.** *sensu* Brodo (1988).

Very rare; on a limestone cliff. (34): Brodo 22801.

***Lepraria finkii* (B. de Lesd. *in* Hue) R. Harris**

Common; on moss over rocks (calcareous or non-calcareous), bases of various trees, or stumps; usually in shade. (4), (13), (14), (15), (21), (24), (25), (27), (29), (30), (31), (32), (33), (34), (35). This is one of the most common *Leprariae* in eastern North America, forming thick leprose masses on shaded substrates. It always contains stictic acid, atranorin and zeorin.

***Lepraria incana* (L.) Ach.**

Frequent; on shaded rocks or tree bases, usually conifers. (9): 2674; (13): 2133; (27): 4489; (29): 2521; (31): 1838, 3049, 3819; (32): 3988; (34): 4539, Brodo 18753, 27625, Shchepanek 134.

Lepraria membranacea auct.

Rare; on shaded rocks. (17): Brown 58 (TRTC); (30): Macoun 3720; (33): 211, 244, 3372.

***Lepraria cfr. neglecta* Vainio**

Infrequent, on granitic cliffs or boulders; in shade. (25): 3718; (29): 2518; (33): 218, 224, 516, 2287, 3489. With the presence of alectorialic acid, the granulose leprose mats of this species are often named as *L. zonata*, but the latter usually forms zonate, orbicular patches.

***Lepraria zonata* Brodo**

Infrequent; on granitic boulders or cliffs; in open or shade. (25): 3160; (31): 2964, 3058, Brodo 25233; (33): 215, 3347, 3186, 3392, Brodo 9646; (34): 2842. Most of the southern Ontario material contains alectorialic acid; a very few specimens contain fumarprotocetraric acid instead.

Leptogium

1. Undersurface covered with white hairs (tomentum) 2
1. Undersurface without tomentum, isidiate or not 3

2. Thallus lead grey to rarely brownish grey, sometimes with white hairs (trichomes) on upper surface near margins; isidia cylindrical, branching. Rare *L. burnetiae* var. *hirsutum*
2. Thallus greenish to blackish, without trichomes on upper surface; isidia usually granular . . . . . *L. saturninum*

3. Thallus crustaceous, tiny areolate becoming verrucose; on soil. Rare . . . . . *L. byssinum*
3. Thallus foliose or near fruticose 4

4. Thallus surface and margins covered with cylindrical to flattened isidia 5
4. Thallus without isidia but the margins may be finely divided so as to appear isidiate 6

5. Thallus of small, squamule-like lobes, 1-4 mm across, olivaceous to grey; apothecia abundant or not. On moss over rocks . . . . . *L. dactylinum*
5. Thallus larger, lobes orbicular, bluish grey; apothecia usually lacking. On rocks, tree base or wood, very common . . . . . *L. cyanescens*

6. Thallus bluish grey; lobes broad, more than 2 mm across, apothecia commonly present. Rare. 7
6. Thallus grey, brown, red brown or dark brown; lobes narrow, usually less than 2mm across (*L. lichenoides* may have lobes up to 3 mm broad); margins finely divided . 9

7. Thallus heavily and irregularly wrinkled, lobes 2-10 mm across . . . . . *L. corticola*
7. Thallus smooth to roughened but not wrinkled 8

8. Lobes mostly more than 3 mm across; apothecia large, more than 1.5 mm in diameter; spores 8 per ascus . . . . . *L. azureum*
8. Lobes narrower, less than 3 mm across; some lobes with small regeneration lobules; apothecia less than 0.7 mm in diameter; spores 4 per ascus . . . . . *L. rivulare*

9. Thallus minutely fruticose, composed of numerous irregularly branched lobes, lobes terete. Rare . . . . . *L. cfr. teretiusculum*
9. Thallus foliose 10

10. Thallus with raised wrinkles on upper surface; lobes 1-3 mm across, finely divided at the margins. Common, especially on mosses over limestone . . . . *L. lichenoides*

10. Thallus smooth; lobes less than 1 mm across, irregularly divided, short, crowded and appearing as clustered coralloid outgrowths. Infrequent . . . . . *L. tenuissimum*

***Leptogium azureum* (Sw.) Mont.**

Very rare; on a tree trunk. (34): Macoun 1524.

***Leptogium burnetiae* Dodge** var. ***hirsutum* (Sierk) P. M. Jörg.**

Rare; on bark of trees. (24): Macoun 1556, 1563; (27): Macoun 624 (TRTC); (34): Macoun 1525.

***Leptogium byssinum* (Hoffm.) Zwackh *ex* Nyl.**

Very rare; on clay soil at edge of woods. (20): Cain 22783 (TRTC). Sierk (1964) cited two specimens of Cain, 1948, York Co. (F, COLO) which could be duplicates.

***Leptogium corticola* (Taylor) Tuck.**

Rare; on trees or on rocks; in woods. (24): Macoun 1520; (27): Macoun 623 (TRTC), 1522 (CANL); (28): Macoun 1531. This predominantly southeastern species is at its northern limit in southern Ontario (Sierk 1964).

***Leptogium cyanescens* (Rabenh.) Körber**

Common; on granitic, limestone boulders, tree bases or old wood, usually in shade. (1), (17), (25), (26), (27), (29), (30), (31), (32), (33), (34).

***Leptogium dactylinum* Tuck.**

Rare; on calcareous or non-calcareous rocks. (10): 2715. Sierk (1964) cited a specimen, Macoun 103 (DUKE), from Ottawa (34).

***Leptogium lichenoides* (L.) Zahlbr.**

Common; on base of trees, wood, or rocks; usually calcareous, and generally among mosses. (5), (10), (12), (25), (27), (29), (30), (31), (32), (33), (34).

******Leptogium rivulare* (Ach.) Mont.**

Very rare; on the base of a *Fraxinus*. (34): Brodo 18746.

***Leptogium tenuissimum*(Dickson) Fr.**

Very rare; on mossy soil. (34): Macoun 23 (TRTC).

******Leptogium* cfr. ***teretiusculum* (Flörke *ex* Wallr.) Arn.**

Infrequent; among mosses over limestone, or base of deciduous trees. (20): 25418 (TRTC); (27): 2407; (30): 2878; (31): 4150; (34): 4371, 4547, Brodo 25501.

***Leptorhaphis contorta* Degel.**

Rare; on *Populus*. (25): 4481; (29): 4239; (31): 4131. This species is distinguished from *L. epidermidis* by its long spores (31-35 μm) and its substrate (on *Populus* instead of on *Betula papyrifera*).

***Leptorhaphis epidermidis* (Ach.) Th. Fr.**

Infrequent; on white birch. (27): 4323; (29): 4238; (31): 4083, 4091, 4134; (34): Macoun 3077; (35): Brodo 9598.

***Lobaria pulmonaria* (L.) Hoffm.**

Common; on rocks or trees in forests. (5), (12), (13), (14), (25), (27), (30), (31), (32), (34), (35).

***Lobaria quercizans* Michx.**

Frequent; on tree trunks, usually deciduous trees, or on logs in forests. (5), (9), (10), (16), (19), (27), (31), (34), (35).

Loxospora

Species of *Haematomma* s.lato with brown disks lacking any red pigmentation in the epihymenium, and generally containing thamnolic acid or related compounds, clearly should be classified in their own genus. This was suggested by Rogers and Hafellner (1988) and adopted by Harris (in Egan 1990).

***Loxospora elatina* (Ach.) Massal.** (Syn. *Haematomma elatinum* (Ach.) Massal.)

Rare; on *Thuja, Pinus strobus* or rarely on rocks. (31): Brodo 25260; (32): 3992, 3995; (33): Brodo 24846. One of our specimens was growing on a granitic rock in a wooded area.

***Loxospora ochrophaea* (Tuck.) R. Harris *in* Egan** (Syn. *Haematomma ochrophaeum* (Tuck.) Massal.)

Infrequent; on bark, especially on white cedar. (20): Cain 25301 (TRTC); (27): Brodo 27605; (31): 3838A; (32): 3974, 4003, 4012.

***Loxospora pustulata* (Brodo & Culb.) R. Harris *in* Egan** (Syn. *Haematomma pustulatum* Brodo & Culb.)

Rare; on white cedar. (31): 3808, 3821; (32): 4011. This recently described sterile species (Brodo and Culberson 1987) is often difficult to distinguish from *L. elatina*.

***Megaspora verrucosa* (Ach.) Hafellner & V. Wirth *in* V. Wirth** (Syn. *Pachyospora verrucosa* (Ach.) Massal., *P. mutabilis* (Ach.) Massal.)

Very rare; on a cedar rail. (24): Macoun 1849. This species has been reported from northern Ontario (Brodo 1977). It is mainly an arctic-alpine species, usually growing on peat or vegetation, but it also grows on bark (especially *Populus*) or wood in the boreal region, where it has been referred to as *Pachyospora mutabilis* (see Brodo 1977). The genus *Megaspora* was established in Wirth (1987) with *M. verrucosa* as the type and only species. The type of *Pachyospora* is *P. calcarea* Massal., which equals *"Lecanora calcarea* Sommerf." according to Choisy (1929) and refers to the *Aspicilia calcarea-contorta* group (Clauzade & Roux 1985).

***Melanelia disjuncta* (Erichs.) Essl.**

Rare; on granitic rocks; in the open. (27): Brodo 27588; (29): 4207; (30): Dawson s.n.. The well-known name *Melanelia disjuncta*, changed to *M. granulosa* (Lynge) Essl. in the new North American checklist (Egan 1987), was reinstated by Esslinger (1990).

***Melanelia exasperatula* (Nyl.) Essl.**

Very rare; on a fallen tree. (33): 2337.

***Melanelia olivacea* (L.) Essl.**

Rare; on bark of trees. (31): 1825; (34): Brodo 24957; (35): Brodo 14797.

***Melanelia septentrionalis* (Lynge) Essl.**

Rare; on bark of trees or fence rails. (34): Macoun 293, 718, 723.

***Melanelia sorediata* (Ach.) Goward & Ahti**

Infrequent; on granitic boulders; usually in shade. (11): Macoun 728; (25): 3161, 3717; (31): 2961, 3898; (32): Brodo 14590; (33): 519, 2322.

***Melanelia subargentifera* (L.) Essl.**

Very rare; on a fallen branch. (14): 1923. This species can be distinguished from *M. subaurifera* by its granular to isidioid soredia and the presence of tiny cortical hairs and pruina on the thallus surface. Only one collection had been reported previously from east of Lake Superior (Esslinger 1977a). It is more commonly found in northern Canada, such as Manitoba, British Columbia and the Northwest Territories.

***Melanelia subaurifera* (Nyl.) Essl.**

Very common; on trees of all kinds or fence rails; in open or shaded areas. (3), (4), (5), (9), (12), (13), (14), (15), (16), (20), (21), (25), (26), (27), (28), (29), (31), (32), (33), (34), (35), (36). This is one of the most common corticolous species in southern Ontario.

***Menegazzia terebrata* (Hoffm.) Massal.**

Rare; on trees of various kinds. (27): 4477, Macoun 569; (32): 4020; (34): Macoun 242, 671. Although Macoun found this lichen on several occasions, only two modern collections have been made. It has a scattered distribution in the Great Lakes region, being mainly associated with bogs and swamps in the northern part of its range, perhaps revealing its oceanic (i.e., moisture) requirements. It is much more abundant in the Appalachians and along the northwest coast. Although it is threatened in southern Ontario by habitat destruction, the population we saw in Hastings County was abundant and in excellent condition.

***Micarea erratica* (Körber) Hertel, Rambold & Pietschmann** (Syn. *Lecidea erratica* Körber) (See key to *Lecidea*.)

Frequent; on non-calcareous boulders or pebbles in open. (12): 2761, 3083; (13): 2018; (27): 2245, 2263, 2275; (29): 4218; (31): 3063, 3066, 3083, Brodo 25220; (33): 327; (34): Shchepanek 3. This species, clearly not part of *Lecidea* s. str., was recently transfered to the genus *Micarea* (Rambold 1989) on the basis of its ascus and ascomatal structure. It is unusual for that genus in having a well-developed exciple. Magnusson (1935) recognized *Lecidea planetica* Tuck. as being closely related to *"Lecidea" erratica*. Lowe (1939) treated *L. planetica* as a variety with a better developed thallus. The thalli of southern Ontario material are very variable, sometimes lacking or becoming well-developed even on the same specimen. We regard all the morphotypes as conspecific.

***Micarea melaena* (Nyl.) Hedl.** (See key to *Bacidia*.)

Infrequent; on stumps, fence rails or rotten wood; in open or in forests. (29): 4213, Brodo 27573; (31): 4142A, Brodo 25120; (32): 4016; (33): 3378; (34): Macoun 393 (TRTC).

***Micarea peliocarpa* (Anzi) Coppins & R. Sant.** (See key to *Bacidia*.)

Frequent; on bark of various trees or stumps or over moss. (5): 1700; (13): 2030; (15): 3605, 3607; (25): 4422; (27) 4499; (32) 4027; (34): 4512.

***Micarea prasina* Fr.**

Rare or overlooked in southern Ontario; on rotten stumps. (31): 4142A; (34): 2862B, 4514, Brodo 27628.

***Microcalicium arenarium* (Hampe *ex* Massal.) Tibell** (See key to Caliciales.)

Rare; parasitic on *Psilolechia lucida* on the well-protected underside of a granitic boulder. (27): 4487, Selva 4182A.

***Multiclavula mucida* (Fr.) R. Petersen**

Rare, on mossy log; in wet and shaded situation. (25): Brodo 27611; (27): Brodo 27619; (34): 4530. This represents the only basidiolichen known from southern Ontario. Its cream-colored or yellowish, club-shaped fruiting bodies (basidiocarps), 10-15 mm high, appear on thick, green algal crusts on moist, rotting logs in forests. The fruiting bodies are not perennial, which probably explains why the lichen is often overlooked and is rarely collected. Whether it is, in fact, a lichen or not depends on one's definition of "lichen." The species was first spotted and pointed out to us by William Buck, for which we are most grateful. One of us also collected a specimen in the Adirondack Mountains of New York (*Brodo 25905* [CANL]).

Mycobilimbia (See key to *Bacidia*.)

Cfr. ***Mycobilimbia accedens*** **(Arn.) V. Wirth *ex* Hafellner** (Syn. *Bacidia accedens* (Arn.) Lett)

Very rare; on a tree. (34): Macoun 486. This specimen agrees well with Harris' (1977) description and material in CANL that he annotated, and we are using the name in his sense. Hafellner (1989) recently validated a combination in *Mycobilimbia* first made by Wirth (1987).

Mycobilimbia berengeriana **(Massal.) Hafellner & V. Wirth *in* V. Wirth** (Syn. *Lecidea berengeriana* (Massal.) Th. Fr.)

Frequent; over moss on tree bases, rocks, soil or rarely directly on rotten wood. (21): 3538; (25): 4420; (27): Macoun 655 (TRTC), 2687 (CANL); (29): 4259; (31): 3813, 4151; (32): 4022, 4023; (34): 4519, Macoun 394, 399 (TRTC), 2677 (CANL). We have adopted the new classification of this species suggested by Wirth (1987) and Hafellner (1989).

Mycobilimbia sabuletorum **(Schreb.) Hafellner**

Common; on moss over trees or rocks, on stumps, wood or growing directly on calcareous rocks. (1), (10), (12), (13), (14), (15), (17), (20), (25), (27), (29), (31), (32), (33), (34).

[Mycobilimbia] tetramera **(de Not)** (Syn. *Bacidia tetramera* (de Not.) Coppins, *Mycobilimbia obscurata* (Sommerf.) Rehm, *Mycobilimbia fusca* (Massal.) Hafellner & V. Wirth *in* V. Wirth)

Frequent; on moss over trees, stumps or rocks, sometimes growing direct on bark. (15): 3627; (24): 3201; (25): 3172, 3671; (27): 4342, 4347; (31): 2976, 3940, 4117; (34): Brodo 25491, Macoun 188. Gilbert et al. (1988) discovered that the holotype of *Bilimbia tetramera* de Not. is conspecific with *Mycobilimbia fusca*, which is regarded to be a synonym of *M. obscurata* (Hafellner 1989). Since the epithet *tetramera* is the oldest at the species level, it should be taken up (although Egan [1990] has not done so). Although it would seem from the synonymy that the species belongs in the genus *Mycobilimbia*, that group is currently under study by Brunnbauer in Vienna (Hafellner 1989) and would more appropriately be dealt with by him.

Mycocalicium subtile **(Pers.) Szat.**

Infrequent; on stumps, dead trunks or bark of coniferous trees. (21): Henssen 28278 (TRTC); (25): Selva 4174A; (27): 4497, Selva 4186A; (31): 3791, 3904 4227, Brodo 16278, Tibell 4619; (34): 4516.

Nephroma bellum **(Sprengel) Tuck.**

Rare; on rocks, usually on moss over rocks. (17): Cain 21937 (TRTC); (24): Macoun 1141; (27): Macoun 1140; (34): Macoun 83, 312, 318 (TRTC). From its habitat and its distribution (see Wetmore 1960), it would seem that this species has oceanic tendencies. In southern Ontario, almost all its localities are close to the Great Lakes or bodies of water. Cain's collection in Halton County in the early 1950's (date uncertain) is the most recent sighting of the species, and it may well be threatened with extinction in this region. The same is true of other species of *Nephroma* that are rare in southern Ontario: *N. helveticum*, and *N. resupinatum*.

Nephroma helveticum **Ach.** subsp. ***helveticum***

Rare; on mossy rocks. (1): Macoun 139; (27): Macoun 1460; (30): 2560. Wetmore (1960) cited the following specimens from Ottawa-Carleton County (34): Macoun 24 april 1892 (FH, MSC, NY, US), Macoun 23 July 1900 (MICH).

Nephroma parile **(Ach.) Ach.**

Frequent; on rocks in shade. (24): Macoun 180 (TRTC); (25): 3726; (27): 4322, 4464; (30): 2527; (33): 352; (34): Macoun 1143.

***Nephroma resupinatum* (L.) Ach.**

Rare; on rocks in woods. (27): Macoun s.n. 28 Sept. 1868; (34): Macoun 1099, s.n. 14 April 1897. Wetmore (1960) cited a specimen, Macoun s.n. (TRTC), from Hastings County (27).

***Ochrolechia androgyna* (Hoffm.) Arn.**

Rare; on cedar. (32): 3994; (34): 1337.

***Ochrolechia arborea* (Kreyer) Almb.**

Common; on trees of all kinds, or fence posts. (9), (13), (15), (20), (21), (25), (26), (27), (29), (30), (31), (32), (33), (34).

***Ochrolechia pseudopallescens* Brodo**

Very rare; on a twig (conifer ?) on ground in cedar swamp. (31): 3859. southern Ontario falls squarely within the range of *O. pseudopallescens* (Brodo 1991), but for some reason, the species has rarely been collected in this region. In fact, a well developed specimen collected just north of Ottawa serves as the type of the species.

***Ochrolechia trochophora* (Vainio) Oshio** (Syn. *O. rosella* (Tuck.) Vers.)

Rare; on granitic cliffs or tree trunks. (30): collector unknown; (31): 3903B.

***Opegrapha varia* Pers.**

Rare; on bark of various trees or fence posts. (5): 1713; (32): Shchepanek 204; (34): Macoun 408, 3050.

Pachyospora (see *Megaspora*)

***Pachyphiale fagicola* (Hepp *ex* Arnold) Zwackh**

Very rare; on red maple in woods. (34): 4540. This species bears tiny (0.3-0.5 mm), orange-brown apothecia with margins that may occasionally have fine hairs. The most distinctive characters of this species are the polysporous asci and the 4-8-celled spores which are pointed at both ends. This species has probably been overlooked because it is so inconspicuous. It is reported here as new to Canada.

***Pannaria ahlneri* P. M. Jörg.**

Very rare; (34): Macoun "Can. Lich." 54. The occurrence of this oceanic species in the Ottawa region is remarkable and, in fact, is suspect. The Macoun specimen is certainly this species, but the locality data for Macoun's series "Canadian Lichens" have sometimes been wrong. The date "April 22, 1899" is handwritten onto the printed label having Ottawa as the locality. Other specimens from CANL indicate that Macoun was in Revelstoke, B.C. on 5 May 1899. It is therefore possible that he collected the specimen farther west, for example in the Lake Superior region, where the species is well documented. The only southern Ontario specimen of *Heterodermia obscurata* is from the same packet. It also would be out of its range in Ottawa, being known mainly from the Lake Superior region (Harris 1977; specimens in CANL from the Thunder Bay District), and southeastern and southwestern United States (Hale 1979), although rather common as far north as New Brunswick (Gowan and Brodo 1988).

***Pannaria leucophaea* (Vahl) P. M. Jörg.**

Frequent; on calcareous or non-calcareous boulders or cliffs. (14): 1937; (25): 3723; (27): 2246, 4309; (30): 2549, Brodo 23541; (31): Brodo 20273; (33): 256, 329, Ward 358; (34): Macoun 1363.

***Parmelia saxatilis* (L.) Ach.**

Rare, on bark of various trees. (3): 1667; (16): Cain 22012A (TRTC); (34): Macoun 622. This species is almost always on rock, but the few specimens cited here were on bark. We compared these specimens with *P. squarrosa*, a similar corticolous species having slender, squarrose rhizinae instead of stout, simple rhizinae.

***Parmelia squarrosa* Hale**

Frequent; on trees of various kinds. (13): 2107; (27): Brodo 27617; (31): 828A, 3826, 3894; (32): 1365; (34): 4527, Macoun 50, 85; (35): Brodo 9599B, 14792; (36): Jenkins 2921.

***Parmelia sulcata* Taylor**

Very common; on trees of all kinds, fence posts, or rocks; in open or in shade. (1), (3), (4), (5), (6), (9), (13), (14), (15), (19), (21), (22), (25), (31), (32), (33), (34), (35), (36). This is one of the most common lichen in southern Ontario. It thrives everywhere on all types of trees, and is considered as one of the most toxitolerant lichens in southern Ontario.

***Parmelina aurulenta* (Tuck.) Hale**

Common; on trees of all kinds, or on granitic cliffs, usually in shaded situations. (13), (19), (20), (24), (30), (31), (33), (34), (35), (36).

***Parmelina galbina* (Ach.) Hale**

Frequent; on bark of deciduous trees, in woods. (25): 3661; (27): Brodo 27577; (30): 2924; (31): 3908. 3969, Brodo 25236; (32): Brodo 14583; (33): 2337; (34): Macoun 240, 593.

***Parmeliopsis ambigua* (Wulfen) Nyl.**

Infrequent; on dead Abies or fence posts. (13): 2040; (14): 1951; (25): 3677; (31): 3884. (35): Catling s.n.. This species is very common in northern Ontario, and was also recorded from the Ottawa Region in Quebec. A northern population of *P. ambigua* having discrete, capitate soralia and a darker (brown to black) undersurface has been tentatively named as *P. capitata* by Harris (1977) and is represented by two specimens from southern Ontario (3677 and 3884).

***Parmeliopsis hyperopta* (Ach.) Arn.**

Rare; on stumps or twigs of trees. (25): 3703; (35): Catling s.n.. This species is very common in northern Ontario. It was also reported from the Ottawa Region in Quebec.

***Parmotrema chinense* (Osbeck) Hale & Ahti** (Syn. *P. perlatum* (Hudson) Choisy)

Rare; on trees or fence posts. (27): 4504, Macoun 567, 569. The genus *Parmotrema* has its center of distribution in the warm temperate to tropical parts of the world (Hale 1965), and so it is not surprising that few species of *Parmotrema* occur in southern Ontario, and that these are all rare to infrequent. *Parmotrema chinense*, although having an Appalachian-Great Lakes distribution, is infrequent in the north; *P. crinitum*, very widespread on a world scale, is still uncommon here. (See discussions of *P. margaritatum* and *P. subtinctorium* in Wong and Brodo [1990]).

***Parmotrema crinitum* (Ach.) Choisy**

Infrequent; on tree trunks or old rails. (16): Cain 21957 (TRTC); (24): Macoun 588, 589; (27): Brodo 27620A; (32): Macoun 176 (TRTC), 3828 (CANL).

***Parmotrema margaritatum* (Hue) Hale**

Very rare; on a tree. (1): Macoun 3626.

***Parmotrema subtinctorium* (Zahlbr.) Hale**

Very rare; on trunk in swamp. (27): Macoun 579; (32): Macoun 3828.

***Peltigera aphthosa* (L.) Willd.**

Rare; on humus or mossy rocks. (13): Cain 25813 (TRTC), Williams 2519; (33): Brodo 25512; (34): Macoun 88, 112, 1184. Although this species is rare in southern Ontario, the colony discovered at Charleston Lake Provincial Park was large and luxuriant. It should be sought in other protected parts of the Canadian Shield in the region. The similar *P. leucophlebia* with smaller, crenate lobes and darker, more distinct veins below, is much more abundant in southern Ontario.

Peltigera canina (L.) Willd.

Common; on tree bases, stumps, logs, humus or rocks, usually over moss; often in the shade. (11), (15), (20), (25), (27), (29), (31), (33), (34), (36).

***Peltigera didactyla* (With.) Laundon**

Common; on soil, on moss over rocks or stumps; usually in open fields. (9), (15), (16), (21), (25), (26), (27), (30), (31), (33), (34). The small thallus of this species is often covered with circular, pale grey patches of soredia. Sterile and fertile are equally common in southern Ontario.

***Peltigera elisabethae* Gyelnik**

Common; on soil, rocks, stumps, logs or bases of trees, often in forests or swamp. (9), (15), (20), (25), (26), (27), (29), (30), (31), (34).

***Peltigera evansiana* Gyelnik**

Common; on mossy rocks, bases of trees, mossy logs or humus, usually in shaded or swampy areas. (4), (13), (15), (17), (20), (25), (27), (29), (30), (31), (32), (33), (34), (35).

***Peltigera horizontalis* (Hudson) Baumg.**

Infrequent; on rocks, logs, stumps or humus, usually in shade. (15): Cain 22886 (TRTC); (23): Cain 25367 (TRTC); (27): 4490, Macoun 688, 697 (TRTC), Macoun 1203, 1309; (31): 1833, 3943; (34): 4352.

***Peltigera lepidophora* (Nyl. *ex* Vainio) Bitt.**

Frequent; on sandy soil, moss over limestone, often on roadsides or in open areas, rarely on tree bases. (9): 2679; (10): Cain 21603 (TRTC); (15): 3639; (16): Cain s.n. (TRTC); (31): 2983, 4176, 4182; (32): 4014. It is an arctic to temperate species in North America ranging from American Arctic, Greenland, Quebec to the Great Lakes area, and in the west to Colorado.

***Peltigera leucophlebia* (Nyl.) Gyelnik**

Common; on mossy logs, humus or moss over rocks, in woods. (12), (13), (15), (16), (17), (20), (21), (27), (31), (32), (34).

***Peltigera membranacea* (Ach). Nyl.**

Very rare; on an exposed moss mat. (29): Brodo 9719. Trevor Goward verified our determination of this specimen. The species has a bi-coastal distribution, being very common in B.C. and in the maritime provinces; it is rare elsewhere.

***Peltigera neckeri* Müll. Arg.**

Common; on rocks, soil, bases of trees or logs, in shaded woods. (9), (11), (16), (20), (23), (25), (26), (27), (30), (31), (32), (34), (36).

***Peltigera neopolydactyla* (Gyelnik) Gyelnik**

Infrequent; on logs or soil, in woods. (16): White 1221; (21): Cain 25362 (TRTC); (31): Gillett 797; (32): collector unknown 1201; (35): collector unknown s.n.. This species differs from *P. polydactyla* in having veins that most often darken inward only gradually instead of abruptly. The lobe margins of *P. neopolydactyla* are quite broad (2-3 cm), flat and even, whereas they do not exceed 2 cm in *P. polydactyla*. and tend to be curled up at the edges, crenate, and often broken. In addition, the rhizinae are generally much longer (7-10 mm vs. less than 5 mm (Vitikainen 1981).

***Peltigera polydactyla* (Neck.) Hoffm.**

Infrequent; on rocks, soil or logs, in woods. (10): Cain 3798, 14604 (TRTC); (13): 2163; (25): 3722; (31): 463; (35): 1191.

***Peltigera ponojensis* Gyelnik**

Common; on soil, rocks, bases of trees or on logs, usually in open fields but also found in shaded areas. (9), (10), (13), (14), (15), (16), (19), (20), (25), (27), (29), (30), (31), (33), (34). This species is apparently common and widespread. Until resurrected by Vitikainen (1981), it was not generally recognized as being distinct from *P. rufescens*. *Peltigera ponojensis* differs from *P. rufescens* by having long and slender rhizinae. In *P. rufescens*, the rhizinae are, in large part, short and apically branching, generally forming a continuous black mat which conceals the veins (Goward, unpublished key). Brodo (1988) did not recognize the southern Ontario specimens identified by Goward as *P. ponojensis* as distinct from *P. rufescens*.

***Peltigera praetextata* (Flörke *ex* Somm.) Zopf.**

Common; on soil, rocks, bases of trees or logs, usually in forests. (2), (4), (9), (13), (14), (20), (25), (26), (27), (30), (31), (32), (33), (34), (36).

***Peltigera rufescens* (Weis) Humb.**

Common; on exposed boulders or soil, rarely in shade. (13), (21), (25), (26), (27), (29), (30), (31), (32), (34).

***Peltigera scabrosa* Th. Fr.**

Rare; on soil or on humus over boulders, in the open. (12): Faull 501 (TRTC); (17): Cain 25865 (TRTC); (34): Grimm s.n.. This is an arctic, boreal and alpine species. It has previously been reported from northern Ontario and in the Ottawa region from Quebec. In North America it ranges from the arctic south to Great Lakes area, Montana and Washington.

***Pertusaria alpina* Hepp *ex* Ahles**

Rare; on *Acer* or other trees. (13): 2101. Dibben (1980) cited a specimen (Macoun 247 [US]) which was collected from Ottawa (34) in southern Ontario. There are several specimens in CANL from the Quebec side of the Ottawa region.

***Pertusaria amara* (Ach.) Nyl.**

Frequent; on trees of all kinds or less often on rock cliffs. (13): 2136; (15): 3591, 3617; (25): 4485; (29): 2497, 4274; (31): 3818,3903A, 4173, 4220, Brodo 16257, 25243, Cain 27151 (TRTC); (32): 3227, 3977; (34): Macoun 1935; (35): collector unknown 84.

***Pertusaria consocians* Dibben**

Rare; on trunks of trees. (19): Macoun 3744; (30): Fink 24584. Dibben (1980) cited three specimens from southern Ontario: Macoun 130p.p. [US], from Ottawa (34): Fink 24584, (MICH, US), both from Beaver Mills (30). Duplicates of Fink's collection are also in CANL.

***Pertusaria leucostoma* Massal.**

Infrequent; on deciduous trees. (26): 3137; (31): 3787, 4230; (32): 3209; (34): Brodo 22768, Macoun 246, 1946, collector unknown 1945, 4145.

***Pertusaria macounii* (Lamb) Dibben**

Frequent; on deciduous trees or rarely conifers. (13): 1993; (27): Macoun 604 (TRTC), 2985; (29): 2490; (30): 2550; (31): 3820, 3957, Brodo 17102, 25238; (32): 3220; (34): Macoun 130, 360, 553.

***Pertusaria opthalmiza* (Nyl.) Nyl.**

Infrequent; on trees of all kinds. (30): 2949; (31): 3833, Brodo 16258, 25237; (32): 3995; (34): Macoun 553, 2361 (TRTC). Dibben (1980) cited three specimens from southern Ontario: Macoun 135 (MICH) and Fink s.n.p.p. (US) from Northumberland County (24); Macoun 129 p.p. (US) from Ottawa (34).

***Pertusaria pustulata* (Ach.) Duby**

Infrequent; on deciduous trees. (3): 1683; (4): 1749; (13): 2147; (30): 265, Brodo 9658; (33): 3394.

***Pertusaria rhexostoma* Nyl.**

Very rare; on bark of a tree. (27): collector unknown, 1960.

***Pertusaria rubefacta* Erichs.**

Rare; on deciduous trees especially *Acer saccharum* and *Quercus* spp.. (29): Brodo 27576; (31): 1810. This species is found in old, undisturbed sugar maple stands throughout the Appalachian-Great Lakes region, and may be a good old-growth indicator.

***Pertusaria trachythallina* Erichs.**

Infrequent; on deciduous trees or less commonly conifers. (16): White 318; (25): 3659; (27): 4465, Brodo 27578; (31): 3828; (32): 3216.

***Pertusaria velata* (Turn.) Nyl.**

Frequent; on deciduous trees, rarely conifers or rocks. (5): Millman 457 (TRTC); (13): 2109; (16): White 1920; (24): Macoun 240; (27): Macoun 603 (TRTC); (31): 1808, 3955, Cain 27148 (TRTC); (32): Macoun 359; (34): Macoun 1936.

Phaeocalicium (See key to Caliciales.)

***Phaeocalicium curtisii* (Tuck.) Tibell**

Common; on *Rhus typhina*. (10): Cain 11815 (TRTC); (11): Cain 22764 (TRTC); (13): Erbisch 212; (17): Cain 22781 (TRTC); (20): Jackson 4913; (27): 4488; (31): 4097, Brodo 25256; (32): Brodo 14558; (34): 4360, Brodo 18745, Tibell 4645. The genus *Phaeocalicium*, although having no photobiont and therefore not a lichen, is included here because of its close relationship with, and similarity to lichenized members of the *Caliciales*. The three species of the genus in southern Ontario are very similar, but they are all substrate-specific species, and differ in the anatomy of the stalk. In *P. curtisii*, hyphae of stalk are narrower, periclinally arranged, and brown throughout. The stalk is occasionally forked.

***Phaeocalicium polyporaeum* (Nyl.) Tibell**

Rare; on polypores. (20): Jackson 5646 (TRTC); (30): Cain 18565 (TRTC). In *P. polyporaeum*, hyphae of the stalk are broadly rectangular, periclinally arranged, and green throughout.

***Phaeocalicium populneum* (Brond. *ex* Duby) A. Schmidt**

Rare; on *Populus*. (21): 3519, 3520. In *P. populneum*, the hyphae of the stalk are narrow, periclinally arranged, brown centrally and hyaline at the surface.

***Phaeophyscia adiastola* (Essl.) Essl.**

Very common; on moss over rocks, also directly on rocks, rarely on bark or wood, usually in shade. (4), (9), (10), (13), (15), (17), (19), (25), (26), (27), (29), (30), (31), (32), (33), (34), (36). This is most common saxicolous, species of the genus in southern Ontario.

***Phaeophyscia cernohorskyi* (Nadv.) Essl.**

Common; on bark of various trees, fence posts, stumps or rocks, in forests or along roadsides. (3), (12), (14), (16), (20), (22), (23), (24), (27), (29), (31), (33), (34).

***Phaeophyscia ciliata* (Hoffm.) Moberg**

Rare; on tree trunks or rarely fence rails. (10): Cain 14611 (TRTC); (31): 3072, 4132; (34): Macoun 57, 59, 303, 843, 844, 888, 893.

***Phaeophyscia endococcina* (Körber) Moberg**

Rare; on limestone cliffs or granitic boulders. (13): 2074; (25): 3718.

***Phaeophyscia hirtella* Essl.**

Infrequent; on tree trunks or fence rails. (24): Macoun 180; (31): 2865, 3079, Brodo 25218; (34): 4534, Macoun 59, 244; (35): Brodo 14794.

***Phaeophyscia hispidula* (Ach.) Moberg**

Rare; on bark of deciduous trees. (24): Macoun 192; (25): 4404. This species is distinguished by its broad lobes (often 2 mm or more), usually with numerous, long black rhizines projecting outward and often upward from the margin.

***Phaeophyscia imbricata* (Vainio) Essl.**

Rare; on mosses over rocks or on *Acer*. (22): 3182; (31): Moore 5712, 6055. This is a very distinctive species, being the only member of the genus with a regularly lobulate thallus and a white lower surface.

***Phaeophyscia orbicularis* (Neck.) Moberg**

Common; on bark of both coniferous and deciduous trees, fence posts or rocks. (4), (9), (14), (16), (17), (22), (25), (31), (33), (34). This species was thought to be primarily a western species in North America (Esslinger 1977b). The southern Ontario material is all sterile but is very typical in morphology. It is distinguished by its laminal and submarginal, punctiform to irregular soralia and relatively fine granular soredia. The medulla is white.

***Phaeophyscia pusilloides* (Zahlbr.) Essl.**

Common; on bark of deciduous trees or fence rails. (9), (13), (14), (15), (16), (21), (24), (25), (26), (27), (29), (30), (31), (32), (34).

***Phaeophyscia rubropulchra* (Degel.) Moberg**

Very common; on bark of various trees, wood or on moss over rocks, usually in shade. (4), (9), (10), (12), (13), (16), (17), (19), (20), (21), (26), (27), (29), (31), (32), (33), (34), (35), (36). This is one of the most common foliose species in southern Ontario.

***Phaeophyscia sciastra* (Ach.) Moberg**

Common; on calcareous or non-calcareous rocks, rarely on wood, in open situations. (14), (17), (25), (27), (28), (29), (30), (31), (33), (34).

***Phlyctis argena* (Sprengel) Flotow**

Infrequent; on bark of various trees, most often on conifers. (15): 3594, 3612, 3618; (27): 4468; (31): Brodo 25214; (32): 3226, 3997, Brodo 18744B; (34): 4508, Brodo 23536. Fertile specimens can be recognized by the ascocarps which are buried in a sorediate mound or area. The spores are large and one per ascus. The sterile thallus may be confused with some *Haematomma* spp. but it contains norstictic acid.

***Physcia adscendens* (Fr.) Oliv.**

Very common; on bark or twigs of various trees, wood, granitic or limestone rocks or cliffs, in the open or shade. (3), (4), (5), (9), (13), (14), (15), (16), (17), (19), (20), (21), (22), (23), (24), (25), (27), (28), (29), (31), (32), (33), (34), (35), (36). This species, together with *Ph. aipolia* and *Ph. millegrana*, are among the most common lichens on roadside trees.

***Physcia aipolia* (Ehrh. *ex* Humb.) Fürnrohr**

Very common; on bark of trees, mostly on deciduous trees. (5), (6), (9), (10), (13), (14), (16), (20), (22), (24), (25), (26), (27), (29), (31), (32), (33), (34).

***Physcia americana* Merr.**

Rare; on trunk of deciduous trees. (24): Macoun 77; (27): Brodo 1981; (32): Macoun 359. This sorediate species has a whitish grey, 1-3 cm broad thallus, closely adnate on bark. The upper cortex of the thallus is shiny, sometimes becoming faintly white-spotted. Rare collections of *Ph. caesia* on bark can be separated by the stronger white-spotting in the latter.

***Physcia caesia* (Hoffm.) Fürnrohr**

Frequent; on granitic or calcareous rocks, very rarely on bark. (14): 1959; (27): 4345; (29): 2515, 4269, Brodo 9673; (30): 785; (31); 1406, 4192; (33): 226, 234, 2286; (34): 2790, 2858. The similarlity of this species to *Ph. americana* is discussed under the latter.

***Physcia dubia* (Hoffm.) Lett.**

Common; on calcareous or non-calcareous rocks, tree trunks or fence posts, in the open or in shade. (14), (16), (17), (19), (20), (21), (22), (23), (25), (27), (29), (31), (33), (34), (36).

***Physcia millegrana* Degel.**

Very common; on bark of various trees, especially on roadside trees, fence posts, or stumps. (1), (3), (4), (5), (9), (13), 14), (15), (17), (19), (20), (21), (22), (25), (29), (31), (32), (33), (34), (35). This is one of the most common lichens in southern Ontario.

***Physcia phaea* (Tuck.) Thoms.**

Infrequent; on granitic boulders or cliffs, in forests. (27): 2231, 4314; (31): 2968, 4092, 4144; (32): Brodo 14553; (33): 204, 3410, 3516; (34): Brodo 13321. This species is closely related to corticolous *P. aipolia*. *Physcia aipolia* however, always has quite heavily pruinose disks, whereas *Ph. phaea* is usually epruinose. The spores of the former are generally larger: (16-)18-20(-21) x (7.5-)8-9(-10) µm vs. 15-16.5(-19) x 7-8(-9) µm.

***Physcia stellaris* (L.) Nyl.**

Very common; on bark of various trees, more often on deciduous trees, fence rails or wood. (3), (4), (5), (6), (9), (10), (12), (13), (14), (16), (20), (21), (22), (25), (27), (28), (29), (30), (31), (33), (34), (35), (36). This is one of the most common corticolous species in southern Ontario.

***Physcia subtilis* Degel.**

Infrequent; on granitic boulders or cliffs, in shade or exposed areas. (25): 368, 3741; (30): 2938B, Dawson s.n.; (31): 1854, 3871, 4051, 4186; (32): Brodo 14562; (33): 208, 2315, 3328, 3416, 3494.

***Physcia tenella* (Scop.) DC.**

Very rare; doubtful. (34): Macoun 166 (TRTC). This specimen had been cited by Thomson (1963). The relationship between this species and *P. adscendens* was discussed by him. *Physcia tenella* is generally restricted to coastal localities in Canada (on both coasts), and so its presence in the Ottawa region is suspect. The possibility of mislabelling with regard to Macoun specimens has already been mentioned (see *Heterodermia obscurata*). It was not included in the list of Ottawa lichens by Brodo (1988).

***Physciella chloantha* (Ach.) Essl.**

Rare; on *Tilia americana* or calcareous rock cliff. (31): 1398; (34): 4548. The genus *Physciella*, a recent segregate of the *Physciaceae* (Esslinger 1986) is represented by two species in southern Ontario. Members of *Physciella* are distinguished from the true *Phaeophysciae* by their prosoplectenchymatous and decidedly pale lower cortices, and differ from *Physciae* by their lack of atranorin and their short, ellipsoid conidia. The distinctive characters of *Ph. chloantha* are the narrow and ascending lobes with labriform soralia, sometimes also with scattered laminal soralia. *Physciella melanchra* has mainly laminal soralia, but very often also has some submarginal or marginal (but not distinctively labriform) soralia which can be very confused with those of *P. chloantha*

***Physciella melanchra* (Hue) Essl.**

Infrequent; on *Thuja*, deciduous trees or fence rails. (4): 1737; (22): 3191; (33): 1300; (34): collector unknown 245, 893; (36): 1243. Esslinger (1986) cited a specimen (Drummond 1865,

[FH]) from southern Ontario. The relationship between this species and *P. chloantha* has been discussed with the latter.

***Physconia detersa* (Nyl.) Poelt**

Very common; on bark of various trees, wood or calcareous rocks. (3), (4), (5), (6), (9), (10), (12), (13), (14), (15), (16), (17), (19), (20), (21), (25), (26), (27), (29), (30), (31), (32), (34), (35), (36).

[Physconia distorta (With.) Laundon]

This species was reported from the Ontario portion of the Ottawa region by Brodo (1988) based on specimens in CANL annotated by J.W. Thomson as "*Physcia pulverulenta* f. *venusta*" and cited in Thomson (1963). Hale (1979), however, stated that *Physconia pulverulenta* (= *Ph. distorta*) is a western species, and that all eastern records seem to be exceptionally pruinose specimens of *Anaptychia "palmatula"* (i.e., *A. palmulata*). The two taxa can be distinguished in a number of ways, based mainly on anatomical details and spore characteristics, but useful field characters are the black undersurface and dense nap of squarrose rhizinae on *Physconia distorta* compared to the white to very pale brown undersurface and more scattered, less branched rhizinae on the *Anaptychia*. There is a Mediteranean taxon called *Physconia venusta* (Ach.) Poelt which, like *Anaptychia palmulata*, has a pale undersurface and marginal lobules (Clauzade and Roux 1985), and it is possible that our southern Ontario material belongs here. Until the group receives more attention, however, we will accept Hale's opinion and regard *Physconia distorta* as absent from the southern Ontario flora.

***Physconia enteroxantha* (Nyl.) Poelt**

Infrequent; on bark of deciduous trees or fence rails. (10): Cain 18808; (27): 2398; (29): 838B; (34): Brodo 22767, Macoun 298; (35): 1186.

***Physconia kurokawae* Kashiwadani**

Rare; on calcareous rocks or *Populus*. (4): Stewart 326; (34): Brodo 5625.

***Physconia perisidiosa* (Erichs.) Moberg**

Frequent; on bark of various trees, fence posts or limestone cliff. (4): 1737; (27): 289; (29): 2493; (31): 1410, 3772, 4225B, Brodo 23439, Tibell 4616; (33): 1282; (34): Brodo 13284; (36): 1779.

Placynthiella (See key to *Lecidea*.)

***Placynthiella icmalea* (Ach.) Coppins & James**

Frequent; on rotten wood, peat or over moss. (21): 3542; (27): 2265; (30): Brodo 27570; (31): 3050, 3915, 4033; (33): 3356, 3378; (34): 1344, 2820, Brodo 22771. This species differs from *Placynthiella uliginosa* in having the following characters: thallus consisting of light to dark green, or greenish brown isidiose to minutely coralloid granules (30-65 μm diam, 65-280 μm tall); apothecia usually with a distinct margin, especially on immature disks; spores 9.5-13 x 4-4.5(6.5) μm; chemistry: gyrophoric acid (by TLC); whereas in *P. uliginosa* the thallus has dark green to dark brown, rounded to slightly elongated (never branched) granules (55-180 μm diam); apothecia becoming marginless and convex; spores 10.5-14 x 5-6 μm; chemistry: no substances by TLC.

***Placynthiella oligotropha* (Laundon) Coppins & James**

Rare; on humus in exposed areas. (25): 4417; (31): 4070, 4073.

***Placynthiella uliginosa* (Schrad.) Coppins & James**

Rare; on soil or peat. (25): 3152; (34): Brodo 21050.

***Placynthium nigrum* (Hudson) S. Gray**

Common; on calcareous rock, rarely on granite, and then probably where there is calcium seepage, rarely on lignum. (13), (14), (16), (17), (18), (23), (25), (27), (28), (30), (31), (32), (33), (34).

***Plagiocarpa hyalospora* (Nyl.) R. Harris**

Infrequent; on bark of deciduous trees. (20): Cain 25250 (CANL), 25652 (TRTC); (27): Macoun 3240; (31): 3961; (34): collector unknown 264.

***Plagiocarpa macrospora* R. Harris**

Very rare; on bark of a *Fraxinus*. (34): Macoun s.n.

***Plagiocarpa phaeospora* R. Harris**

Rare; on bark of deciduous trees. (27): Macoun 3259. Harris (1973) cited another specimen from southern Ontario: (34): Macoun 16 Oct. 1907 (FH).

***Plagiocarpa septemseptata* R. Harris**

Rare; on bark of deciduous trees. (27): Macoun 271 (TRTC), Macoun 3240, 3259 (both CANL). Harris (1973) cited three additional specimens from southern Ontario: (34):Macoun 16 Oct. 1907 (FH), Macoun 20 Apr. 1905 (FH), Eckfeldt 189-2 (LD).

***Platismatia tuckermanii* (Oakes) W. Culb. & C. Culb.**

Infrequent; on conifer trees or fence rails. (27): 4505, collector unknown 236; (30): Ward 331; (33): 284; (34): Brodo 24962.

****Polyblastia cfr. obsoleta* Arn.**

Very rare; on a limestone rock on rocky shore. (13): 2123.

***Polysporina simplex* (Dav.) Vězda**

Frequent; on non-calcareous rocks. (25), (27), (28), (29), (31), (32), (33), (34).

Porpidia

The genus *Porpidia* has recently been revised by Gowan (1989), necessitating some changes to the treatment of the genus in the Ottawa flora (Brodo 1988). A new key to the species of the region is therefore presented below.

1. Thallus soraliate; apothecia pruinose 2
1. Thallus without soredia; apothecia pruinose or naked 3

2. Thallus medulla IKI-; thallus smooth to rimose, continuous, lacking a prothallus, containing stictic acid alone . . . . . *Porpidia* sp.
2. Thallus medulla IKI+ blue; thallus thick, areolate to verrucose, usually with a conspicuous black prothallus; containing 2'-O-methylmicrophyllinic and confluentic acids (and lacking stictic and norstictic acids) . . . . . *Porpidia tuberculosa*

3. Apothecia conspicuously grey pruinose with darker margins; thallus well-developed, smooth to rimose, continuous, containing abundant stictic and/or norstictic acids (KOH+ yellow to red); exciple carbonaceous black at outer edge, pale and radiate within; generally in shaded habitats . . . . . *Porpidia albocaerulescens*
3. Apothecia epruinose, or rarely lightly pruinose; thallus thick or thin, often largely endolithic; stictic and norstictic acids either absent or in very low quantity (thallus KOH- or + yellow); exciple relatively uniform from outer edge to hypothecium; generally in very open habitats 4

4. Exciple carbonaceous throughout (cellular structure not discernable in thin

sections); apothecial margin thin, somewhat raised, often cracked and brittle; epihymenium orange-brown, often giving the disk a reddish-brown colour when moistened . . . . . *Porpidia tahawasiana*

4. Exciple with a cellular structure visible in thin sections; apothecial margins not cracked and brittle, thin or thick; epihymenium usually olivaceous-brown; apothecia not appearing reddish when moistened 5

5. Apothecia small, rarely exceeding 1.2 mm in diameter; hymenium 60-75(-100) µm high; spores 11-15(-19) x 6-7.5(-8) µm; thallus usually epilithic, thin or thick, smooth to verrucose . . . . . *Porpidia crustulata*

5. Apothecia large, often over 1.0 mm in diameter and reaching 2.5 mm; hymenium (60-)75-120 µm; spores (12-)13.5-19(-23) x (5-)7-8.5(-10.5) µm; thallus often endolithic, especially on granite, but can be thick in some morphotypes, smooth to verruculose . . . . . *Porpidia macrocarpa*

***Porpidia albocaerulescens* (Wulfen) Hertel & Knoph**

Frequent; on non-calcareous boulders or cliffs, in forests or shaded areas. (27): 4495, Brodo 27580; (29): 2523; (30): 2532; (31): 3902, 4056, Brodo 25229; (33): 248, 3385, 3483; (34): 4549. This species is very distinctive and can be identified at sight in the field. Its smooth, pale, rather thick thallus, pruinose disks and sunken or partially sunken apothecia distinguish it from other southern Ontario *Porpidiae*. Most southern Ontario material contains stictic and norstictic acids, i.e., chemotype I (Gowan 1989).

***Porpidia crustulata* (Ach.) Hertel & Knoph**

Common; on non-calcareous rocks, in the open or in shade. (13), (16), (21), (25), (26), (27), (30), (31), (33), (34), (36). This species is, in general, a small version of *P. macrocarpa* (see the key). The cells of the exciple, however, are larger than those of the latter (Gowan 1989), but are difficult to discern and measure with hand sections.

***Porpidia macrocarpa* (DC.) Hertel & Schwab**

Frequent; on non-calcareous rocks, frequently in shade, less often in exposed areas. (25): 3713, 3728; (27): 2273; (30): 2539; (31): 3004, 3033, 4085, Brodo 25231; (33): 3499; (34): 2823, 2849.

***Porpidia tahawasiana* Gowan**

Rare; on granitic boulders at water's edge or in forests. (33): 393, 3343, 3508. Most specimens treated in Brodo (1988) under the name *P. cinereoatra* (Ach.) Hertel & Knoph belong here. The latter is quite a different species (Gowan 1989) and has not yet been found in southern Ontario. *Porpidia tahawasiana* is a relatively common species in northeastern North America.

***Porpidia tuberculosa* (Sm.) Hertel & Knoph in Hertel**

Very rare; on granitic rocks on talus slope. (27): 4491. This striking species, easily identified by its round, greyish soralia, thick thallus, and blue medullary reaction with IKI, was found together with several other rare species on a talus slope in Bancroft reported in Wong and Brodo (1990).

***Protoblastenia rupestris* (Scop.) J. Stein.**

Common; on calcareous rocks, in forests or open field. (12), (13), (14), (25), (26), (29), (31), (33), (34). In southern Ontario, this saxicolous, crustose species is distinctive since no other orange-fruiting species has the similar marginless apothecia or non-septate spores.

***_Psilolechia lucida_ (Ach.) M. Choisy**

Very rare; on the shaded lower surface of overhanging granitic rocks on a talus slope. (27): 4487.

***Psora pseudorussellii* Timdal**

Rare; on calcareous boulders in open. (27): 4336A; (29): 4251, 4281. Timdal (1986) pointed out that most eastern records of *P. russellii* (Tuck.) A. Schneider refer to *P. pseudorussellii*. True *P. russellii* is a southwestern, terricolous species containing norstictic acid with several morphological distinctions (see Timdal 1986 and Brodo 1988). *Psora pseudorussellii* has been reported from the Ottawa region in Quebec but is reported here as new to southern Ontario.

***Punctelia bolliana* (Müll. Arg.) Krog**

Infrequent; on *Thuja*, or more common on deciduous trees. (1): collector unknown 3627; (3): 1642; (27): 277, 2417, Brodo 9679; (28): Ball s.n., Brodo 9705; (34): Dickson 182. *Punctelia bolliana* differs from all other *Puncteliae* in southern Ontario in lacking soredia and isidia.

***Punctelia borreri* (Sm.) Krog**

Very rare; on the base of an *Ulmus americana*. (34): Brodo 13283.

***Punctelia rudecta* (Ach.) Krog**

Very common; on bark of various trees, rock cliffs or boulders, or wood; often in shaded forests, less frequently in open situations. (1), (3), (4), (9), (13), (14), (15), (16), (17), (20), (21), (23), (24), (25), (26), (27), (30), (31), (32), (33), (34), (35). This species is one of the most common foliose species in southern Ontario.

***Punctelia subrudecta* (Nyl.) Krog**

Infrequent; on bark of various trees, mainly *Thuja* and *Acer*.(13): Wetmore 3991; (16): Cain 26398; (20): Cain 27122; (27): 2251; (29): 2483.

***Pyrenula laevigata* (Pers.) Arn.**

Very rare; on ash. (34): Macoun 265. This specimen has been cited by Harris (1973).

***Pyrenula macounii* R. Harris**

Infrequent; on bark of deciduous trees. (16): Cain 26694, 26743 (TRTC); (20): Cain 25305, 25310 (TRTC); (27): Macoun 3274 (holotype); (34): Macoun 423 (TRTC).

***Pyrenula pseudobufonia* (Rehm.) R. Harris**

Frequent; on bark of deciduous trees, frequently on beech trunks. (20): Cain 25305; (21): Imshaug 26968; (24): Macoun 3270; (27): Macoun 3079; (31): 4045, Brodo 25235; (34): 4385, Macoun 78, 228, 3275; (36): Macoun 3271. All the Macoun and Imshaug specimens were also cited by Harris (1973). In addition, he cited also the specimen, Cain 26694 (US) from Peel County (16). All these specimens were formerly named *P. neglecta*.

***Pyrenula subelliptica* (Tuck. in Lea) R. Harris**

Very rare. We have not seen any specimen from southern Ontario, but Harris (1973) cited a specimen (Macoun, 6 Sept. 1891 [MICH] from Ottawa-Carleton County (34) which was formerly named *P. imperfecta*.

***Pyrrhospora varians* (Ach.) R. Harris** (Syn. *Lecidea varians* Ach.) (See key to *Lecidea*.)

Infrequent; on bark of deciduous trees. (24): Macoun 160, 178; (27): Macoun 474, 621 (TRTC), Macoun 1790, 3048; (34): Macoun 187, 220, 398, 3075; (35): Macoun 16 (TRTC), s.n. 17 Apr. 1902 (CANL).

***Pyxine sorediata* (Ach.) Mont.**

Common; on bark of all kinds, mainly deciduous trees or *Thuja*, sometimes lignum, and rarely on rock. (4), (16), (24), (25), (27), (29), (30), (31), (32), (34), (35). The present and

past distribution of this species shows the trend of disappearance of forests in southern Ontario (Fig. 3).

***Ramalina americana* Hale**

Common; on trees of all kinds, or wood. (5), (15), (16), (20), (24), (25), (26), (27), (29), (30), (31), (32), (33), (34).

***Ramalina dilacerata* (Hoffm.) Hoffm.**

Rare; on trees of various species. (13): 2029, 2169; (31): Cain 27027 (TRTC).

***Ramalina intermedia* (Del. *ex* Nyl.) Nyl.**

Common; on calcareous or non-calcareous rock cliffs, boulders, fence rails or on tree bark of various kinds. (10), (13), (20), (25), (26), (27), (29), (30), (31), (32), (33), (34).

***Ramalina obtusata* (Ach.) Bitt.**

Infrequent; on rocks, cliffs or deciduous trees. (5): Millman 495 (TRTC); (13): 1988; (20): Cain 27227, Macoun 20213, 27110, 27227, 27229 (TRTC); (33): Brodo 21046; (34): Macoun 245.

Rhizocarpon

1. Thallus greenish yellow, with a conspicuous black prothallus; crescent-shaped areoles or verrucae partially surrounding immersed apothecia; medulla IKI+ blue; spores very dark greenish brown, 30-38 x 12-16 μm, muriform, many-celled. Rare; on exposed granitic rocks . . . . . *R. lecanorinum*
1. Thallus grey to brown or orange 2

2. Spores 1-3-septate (rarely submuriform), hyaline 3
2. Spores muriform 6

3. Spores constantly 1-septate, 13-24 x 8-10 μm; thallus continuous, becoming rimose, brown to brownish grey 4
3. Spores (1-)3-septate, 15-21 x 6-7.2 μm; thallus areolate 5

4. Thallus KOH- or yellowish, sometimes containing stictic acid; apothecia sessile, persistent, 0.5-1.0 mm; spores 18-24 x 8-10 μm. Very rare . . . . . *R. hochstetteri*
4. Thallus KOH+ yellow becoming red (norstictic acid); apothecia tiny, 0.2-0.5(-0.7) mm diameter, mostly immersed; spores 13.5-18(-24) x 7-12 μm. Infrequent . . . *R. cinereovirens*

5. Thallus rusty orange; apothecia often "gyrose" (with rings of sterile tissue in the disk). Very rare . . . . . *R. oederi*
5. Thallus dark brown; apothecia never gyrose. Infrequent . . . . . *R. submodestum*

6. Spores (1-)2 per ascus; thallus dark brown or grey-brown, areolate, with marginless apothecia between the areoles. Rare . . . . . *R. geminatum*
6. Spores mostly 8 per ascus 7

7. Thallus KOH+ red, PD+ yellow (norstictic acid); thallus pale grey, verrucose-areolate; apothecia sessile, with thick, prominent margins; spores hyaline, becoming darker when old, 20-25(-34) x 8.5-11(-16) μm. Rare . . . . . *R. plicatile*
7. Thallus KOH- or + yellow, PD-; thallus grey to brown 8

8. Spores dark brown, 26-31 x 12-14 μm; thallus dark, pinkish brown to grey-brown, thick, verrucose-areolate, with convex, marginless apothecia between the areoles; medulla weakly IKI+ blue, cortex C+ pale pink (gyrophoric acid). Common; on exposed rock . . . . . *R. grande*

8. Spores hyaline; thallus areolate, flat; apothecia generally with a persistent margin; medulla IKI-; cortex C- 9

9. Spores usually with 5-7(-9) transverse septa and 1-2 longitudinal septa, 23-35 x 10-15 μm; thallus pale pinkish brown to greyish brown, or ochraceous (orange); apothecia immersed between areoles, margin often paler than disk. Frequent; on rocks in or close to running water . . . . . *R. lavatum*

9. Spores with 3-4 transverse septa and 1 longitudinal septum, 24-29 x 11-14 μm; thallus grey-brown, continuous to rimose; apothecia sessile to more or less immersed, margin black or appearing pseudolecanorine. Infrequent; on dry rocks . . . . *R. obscuratum*

***Rhizocarpon cinereovirens* (Müll. Arg.) Vainio**

Infrequent; on granitic boulders, in forests or open areas. (27): 4319, Brodo 27579; (30): 398, 2537; (31): 1393, 4093; (33): 3436, Brodo 25504.

***Rhizocarpon geminatum* Körber**

Rare; on granitic boulders, in open. (23): Krug 233; (25): 3744; (31): 1843. This species may be confused with *R. disporum* (Naeg. *ex* Hepp) Müll. Arg. Most of the asci in southern Ontario material contain two spores per ascus, but some apothecia may have single spored asci as well. Most of the above specimens were formerly named *R. disporum*, a species in which the asci are constantly one-spored.

***Rhizocarpon grande* (Flörke *ex* Flotow) Arn.**

Frequent; on granitic boulders, in exposed areas. (14): 1941; (27): 2270, Brodo 27587; (29): 4210, 4284, Brodo 9711; (31): 1846A, 2971, 3032, 4191; (32): Brodo 14595; (33): 306, 432, 2310 3512; (34): 2833. The southern Ontario material contains gyrophoric and stictic acids, some may also have trace of norstictic acid.

***Rhizocarpon hochstetteri* (Körber) Vainio**

Very rare; on granitic rock; in shaded woods. (30): Brodo 27568. This species is closely related to *R. cinereovirens*, but *R. hochstetteri* has a more or less continuous, smooth thallus and lacks norstictic acid. We regard them as more than chemical strains of the same species, in agreement with Timdal and Holtan-Hartwig (1988).

****Rhizocarpon lavatum* (Ach. *ex* Fr.) Hazsl.**

Rare; on granitic rocks near water. (26): 4438, Brodo 27593.

***Rhizocarpon lecanorinum* Anders.**

Rare; on granitic boulders. (14): 1946; (31): 3877, Brodo 23436; (33): 343. It is perhaps the most temperate of the yellow species of *Rhizocarpon* (i.e., subgenus *Rhizocarpon*) but is still rare in our area.

***Rhizcarpon obscuratum* (Ach.) Massal.**

Frequent; on granitic boulders, in shaded situations. (25): 3153, 3668; 4425; (27): 4486; (29): 4217; (30): 2903; (31): 3880, 3900; (32): Brodo 14594; (33): 375, 3492; (34): 2850, 3159A.

****Rhizocarpon oederi* (G. Web.) Körber**

Very rare; on granitic boulder on a talus slope. (27): 4491, Brodo 27593.

***Rhizocarpon plicatile* (Leight.) A. L. Sm.**

Rare; on granitic boulders. (29): 2502, 4217; (33): 381, 392, 498; (34): 1840, 2850. This species may easily be confused with *R. obscuratum* because of its hyaline, muriform spores. *Rhizocarpon plicatile*, however, contains norstictic acid and *R. obscuratum* has no substances at all. In using the name *R. plicatile*, rather than its synonym, *R. rubescens* Th. Fr., we are following Cannon et al. (1985) and Santesson (1984). Gowan and Brodo (1988) used "*rubescens*" in their key, but not in their checklist. We have seen many specimens of *R. plicatile* misidentified as *R. eupetraeum* (Nyl.) Arn. (another norstictic-containing species) and vice-versa, probably due to the unreliable iodine reaction in the medulla of the latter. Lamb (1954) commented on this. Probably the best distinguishing feature of the two species is the colour of the spores (dark in *eupetraeum*).

***Rhizocarpon submodestum* Vainio**

Infrequent; on granitic boulders in open fields. (13): 2015; (26): 3104; (31): 3067, 4075, 4109; (33): 373; (34): Macoun 2648. We are following Feuerer (1978), who places *R. tetramerum* (Vainio) Vainio as a synonym of *R. submodestum* Vainio citing an unpublished (1972) paper by Bialecki.

***Rhizoplaca subdiscrepans* (Nyl.) R. Sant.**

Rare; on granitic rocks. (33): 213, 341; (34): Brodo 13316. The material from southern Ontario morphologically agrees with the European *R. subdiscrepans* in being dispersed areolate (with slightly lobate areoles), rather than clearly umbilicate as in typical *R. chrysoleuca* (Sm.) Zopf. From the material in CANL, it would seem that *R. chrysoleuca* s. str. is very rare east of Thunder Bay District. (There is one specimen from Manitoulin Island in Ontario, and another from Halifax, Nova Scotia.) Furthermore, the chemistry of the eastern material is very uniform, which is noteworthy in this chemically diverse genus. All the material we have tested so far contains only pseudoplacodialic and usnic acids. The North American material of the genus is badly in need of revision, and so we may well have to revise our notion of the species as more material is studied.

Rinodina

Several undescribed species of *Rinodina* have been found in southern Ontario and will be included in a revision being prepared by John Sheard. Keys and discussions will appear in that work, so we are not including them here.

***Rinodina ascociscana* Tuck.**

Infrequent; on beech or maple trees. (5): Macoun 502 (TRTC); (27): Macoun 1881, 1882; (29): Brodo 27575; (31): Brodo 20571A; (34): Macoun 169, 569. This species can be recognized by its unusually large spores (30-35 x 12-16 μm).

***Rinodina bischoffii* (Hepp) Massal.**

Very rare; on concrete near a dock. (33): Brodo 23544.

***Rinodina dakotensis* H. Magn.**

Infrequent; on bark of various trees. (4): 1762; (21): 3518; (25): 3168; (27): Macoun 2735; (34): Macoun 18, 127, Shchepanek 136B.

***Rinodina degeliana* Coppins**

Rare; on *Acer*. (13): 2141; (34): 4525, 4541. The specimen from southern Ontario is sterile. This sorediate species is difficult to distinguish from another sorediate species, *R. efflorescens*, in the sterile state because of the similarity of thallus morphology. The whitish soredia of *R. efflorescens*, contrast with the rest of the thallus, whereas there is little, if any, distinction between the color of the greenish soredia and thallus in light grey forms of *R. degeliana*. Moreover, *R. degeliana* differs from *R. efflorescens* in possessing atranorin and

zeorin rather than pannarin. The two species were growing side by side in two collections from southern Ontario. It is new to North America.

***Rinodina efflorescens* Malme**

Rare; on deciduous trees. (25): 3663; (31): 3913; (34): 4525, 4521.

***Rinodina exigua* (Ach.) S. Gray**

Very rare; on fence post. (33): 1291. New to Ontario.

Rinodina iowensis Zahlbr. (see *R. oxydata*)

***Rinodina oxydata* (Massal.) Massal.**

Common ; on granitic or limestone boulders; in forests or exposed fields. (14): 1940; (25): 4416; (27): 2258; (29): 2472; (30): 2882, 2899; (31): 2998, 3013, 3027, Brodo 20570B; (32): 3204; (33): 302, 326, 478, 2279, 3013, 3400; (34): 1863, Brodo 22776A, Macoun 1752, 1895, 1905, Shchepanek 9; (36): 1197. The material treated under *R. iowensis* in Brodo (1988) belongs to *R. oxydata* (Sheard, in litt.).

***Rinodina pachysperma* H. Magn.**

Rare; on maple trees. (27): Macoun 1889, 1890; (34): Macoun 357, 1893.

***Rinodina polyspora* Th. Fr.**

Very rare; on a young maple tree. (34): Macoun 127, 236.

***Rinodina populicola* H. Magn.**

Rare; on tree bark, mainly on deciduous trees. (27) Macoun 496, (TRTC) and 1896, 2735, 2997 (CANL); (31): 3078; (34): 1217, Macoun 236, 293 (CANL) and 357 (TRTC).

***Rinodina subminuta* H. Magn.**

Common; on deciduous tree bark especially *Acer saccharum*, or rarely lignum. (5), (13), (24), (27), (29), (30), (31), (32), (34), (35).

***Rinodina tephraspis* (Tucks.) Herre**

Frequent; on granitic boulders. (25): 4410; (30): 2538, 2881, 2893; (31): 1845, 2959; (32): 3205; (33): 318, 455, Brodo 24845; (34): Brodo 21048.

***Rinodina thujae* (H. Magn.) Sheard**

Rare; on *Acer saccharum*. (34): 4525, 4541. This is one of two species of *Rinodina* containing pannarin (and having a PD+ orange thallus) that are found in southern Ontario, the other being *R. efflorescens*. *Rinodina thujae* has a subsquamulose, non-sorediate thallus, whereas *R. efflorescens* has an areolate thallus producing granular soredia in discrete soralia. The two species have been collected together in southern Ontario. *Rinodina thujae* is an addition to the flora of Ontario.

***Sarcogyne clavus* (DC. *in* Lam. & DC.) Krempelh.**

Infrequent; on non-calcareous rocks in the open or, less frequently, in forests. (25): 4424; (29): 861; (31): 1843; (33): 499, 3402.

***Sarcogyne privigna* (Ach.) Massal.**

Infrequent; on non-calcareous boulders or cliffs in shaded situations. (21): Krug 229; (25): 3747B; (31): 2967; (34): 4544.

***Sarcogyne regularis* Körber**

Common; on calcareous boulders or cliffs in shaded or open situations. (10), (13), (15), (17), (21), (25), (27), (29), (30), (31), (33), (34), (36).

***Sarcosagium campestre* (Fr.) Poetsch & Schiedem.**

Rare; on soil or over moss, in open. (31): 4147, 4179B.

Scoliciosporum (See key to *Bacidia*.)

***Scoliciosporum chlorococcum* (Stenham.) Vězda**

Very common; on trees of all kinds, or fence posts, in forests or in open fields. (3), (4), (5), (6), (9), (12), (13), (14), (15), (16), (19), (21), (22), (24), (27), (28), (29), (31), (33), (34), (35), (36). This is one of the most common corticolous, crustose species in southern Ontario, perhaps because it is a toxitolerant species (LeBlanc 1972).

***Scoliciosporum umbrinum* (Ach.) Arn.**

Rare; on granitic boulders, in open, or sheltered areas. (25): 3693, 3714; (31): 4185; (33): 491, 504, 3437B.

***Solorina saccata* (L.) Ach.**

Common; on moss over soil or humus over rocks, usually calcareous rocks, in moist or shaded situations. (13), (14), (16), (25), (27), (29), (31), (33), (34).

***Sphinctrina anglica* Nyl.** (See key to Caliciales.)

Rare; parasitic on lichens (especially *Lecanora*) over wood or *Abies balsamea*. (29): 4289; (34): Brodo 22761B. This species closely resembles *Chaenotheca*, but it has extremely short stalks and somewhat larger spores, 8-10 μm in diameter, or 10-11 x 6-8 μm.

Staurothele

This genus has been revised by Thomson (in press), and so the species listed below (based on his determinations) will not be discussed here.

***Staurothele areolata* (Ach.) Lettau**

Rare; on limestone, open. (28): 2362, 2370; (29): 2439; (34): Brodo 22788A, Harris 12154.

***Staurothele diffractella* (Nyl.) Tuck.**

Rare; on granitic boulders. (33): 423, 461B.

***Staurothele drummondii* (Tuck.) Tuck.**

Rare; on calcareous or granitic boulders. (13): 1990, 2078, 2085; (33): 3352.

***Staurothele fissa* (Taylor) Zw.**

Rare; on granitic or calcareous boulders, in or near water. (25): 3765, 4447; (33): 3463.

Stenocybe (See key to Caliciales.)

***Stenocybe major* Nyl. *ex* Körber**

Rare; on *Abies balsamea*. (25): Selva 4170A; (31): 3834, 3856. This species has been reported from Thunder Bay District, northern Ontario (Tibell 1975). Both species of *Stenocybe* in southern Ontario are unlichenized and are highly substrate-specific, *S. major* on *Abies balsalmea*, and *S. pullatula* on *Alnus incana* (Selva 1988). Lacking a visible thallus, they are extremely inconspicuous and have therefore been rarely collected. They are both undoubtedly more common than the few cited collections would indicate.

***Stenocybe pullatula* (Ach.) B. Stein.**

Rare; on *Alnus incana* ssp. *rugosa*. (25): 4480; (27): Selva 4167a, 4191A; (33): Gowan 5069.

***Stereocaulon dactylophyllum* Flörke**

Very rare; on stone. (34): Macoun 2017. This specimen was growing mixed with *S. tomentosum*.

***Stereocaulon paschale* (L.) Hoffm.**

Very rare. (21): Keddy 127. This species is a boreal lichen, common in northern Ontario. The specimen was found in Matchedash Lake, probably the southern limit for this species.

***Stereocaulon saxatile* H. Magn.**

Common; on granitic boulders, in open. (13), (14), (25), (26), (27), (29), (30), (31), (32), (33), (34).

***Stereocaulon tomentosum* Fr.**

Rare; on soil or rocks in the open. (31): 4106; (34): 3231, Brodo 24955, Macoun 367, 2017.

***_Strangospora pinicola_ (Massal.) Körber**

Very rare; on the bark of a *Populus*. (9): 2696.

***Strigula jamesii* (Swinscow) R. Harris**

Very rare. Although we have not seen any specimen from southern Ontario, Harris (1973) cited a record of "*Arthopyrenia affinis* (Massal.) R. Harris," (Macoun, 12 Apr. 1895 [FH]) from the Ottawa region (34). American records of *A. affinis* are believed to be *Strigula jamesii* according to Egan (1987).

***Strigula stigmatella* (Ach.) R. Harris**

Rare; on *Thuja*, or over moss on the base of *Thuja*, or on limestone cliffs. (25): 4421; (31): 3831, Brodo 25119; (34): 4526, Brodo 25499 and 27626. This species is distinguished by its continuous, smooth gray crust and by its 7-septate spores over 25 μm in length.

***Strigula* sp.**

Very rare; on the base of a *Thuja*, in a cedar swamp. (31): 3811. A specimen from Stubirski Lake in Renfrew County was annotated by Harris (in 1989) as a species of *Strigula*, perhaps new, intermediate between *S. phaea* (Ach.) R. Harris and *S. viridiseda* (Nyl.) R. Harris. It has 1-septate ascospores, 11-13.5 x 3.0-3.5 μm, with cells approximately equal in size. The thallus is thin and largely endophloedal.

***Teloschistes chrysophthalmus* (L.) Th. Fr.**

Rare; on trees or fence rails. (1): Macoun 3642, 3644; (9): Macoun 529. Faull (1913) reported that this species was collected along Lake Erie and Lake Ontario in Toronto Region, but we have not seen any specimen collected since. It is probably extinct in southern Ontario.

Thelidium

The two species reported here should be regarded as only tentatively named. The genus *Thelidium* badly needs revision, especially in North America.

***_Thelidium decipiens_ (Hepp) Krempelh.**

Very rare; on calcareous rocks, on rocky shore. (13): 2077, 2123.

***_Thelidium papulare_ (Fr.) Arn.**

Very rare; on a calcareous rock in Petroglyphs Provincial Park. (25): 3699.

***_Thelocarpon superellum_ Nyl.**

Rare; on soil or decayed logs, in open. (20): Cain 25720 (TRTC); (31): 4102, 4179A, Brodo 25259.

***_Thermutis velutina_ (Ach.) Flotow**

Very rare; on a limestone cliff. (13): 2001.

***Toninia caeruleonigricans* (Lightf.) Th. Fr.**

Rare; on calcareous rocks. (13): 2092; (33): 325, 451, Brodo 23545A. The thallus consisting of bluish grey pruinose, subglobose to lobed verrucae, with flat, black, lecideine apothecia with thin margins, and 2-celled, hyaline ascospores make this species easy to identify. It has a widespread, circumpolar distribution on calcareous substrates, including rock and soil, but is rare in our region.

***Trapelia involuta* (Taylor) Hertel**

Very rare; on a granitic boulder at the water's edge. (33): 3339. It is not uncommon elsewhere in temperate eastern North America and Europe.

***_Trapelia placodioides_ Coppins & P. James**

Common; on granitic boulders, usually in forests or partially shaded areas in field. (11), (12), (14), (19), (27), (31), (32), (33), (34).

Trapeliopsis (See key to *Lecidea*.)

***Trapeliopsis flexuosa* (Fr.) Coppins & P. James**

Frequent; on fence posts, rotten logs or charred stumps, in the open or in forests. (14): 1933; (15): 3582; (29): 2447; (31): 4031, 4143; (33): 3406; (35): collector unknown 17. This species has been reported from Ottawa region in Quebec and northern Ontario.

***Trapeliopsis granulosa* (Hoffm.) Lumbsch**

Common; on fence posts, rotten logs, charred stumps, or soil, in the open. (1), (15), (17), (21), (25), (29), (31), (32), (33), (34), (35).

***Trypethelium virens* Tuck. *ex* Michen. *in* Darl.**

Rare; on beech trees. (24): Macoun 3217; (27): Macoun 3216; (34): Macoun 419, 3215, 3219. This species is of unusual interest as it is the only southern Ontario representative of a very large tropical genus, closely related to *Pyrenula*. It is easy to recognize by its ascomata (perithecia) which are aggregated and embedded in a fertile verrucae (stromae). The verrucae may be up to 5 mm in diameter. It is most often found in old, undisturbed forests.

***Umbilicaria deusta* (L.) Baumg.**

Frequent; on granitic boulders or cliffs in open or, less frequently, in shaded areas. (14): 1947; (25): 3151, 3743; (29): 2511; (31): 3779; (32): Brodo 14598; (33): 313, 3500.

***Umbilicaria mammulata* (Ach.) Tuck.**

Frequent, on granitic cliffs or boulders; in forests or partially shaded areas. (21): Cain 18795; (23): Cain 25239 (TRTC); (25): 3750; (30): Macoun 3689; (31): 1836; (33): 310, 3363B, 3374, 3488.

***Umbilicaria muehlenbergii* (Ach.) Tuck.**

Infrequent, on granitic boulders in the open or, less frequently, in forests. (25): 3157, 3748, Macoun 336 (TRTC); (27): 2236; (29): 4203; (31): 3910; (33): 312, 342, 3426, 3496.

***Umbilicaria vellea* (L.) Ach.**

Infrequent; on granitic cliffs or exposed vertical rockfaces, often on lake shores, sometimes on more protected, shady cliffs. (26): Cain 25426, Hanes s.n.; (29): 4202; (30): Dawson and Williams s.n.; (33): Ward 349.

***Usnea filipendula* Stirton**

Rare; on trees. (13): Cain 26611 (TRTC); (20): Cain 25324 (TRTC). This is a boreal forest species, frequently encountered in conifer forests in northern Ontario.

***Usnea hirta* (L.) Weber *ex* Wigg.**

Frequent; on coniferous trees or wood. (13): 2041, Johnson 10; (20): Brown 409 (TRTC); (21): Cain 28282 (TRTC); (29): 851; (32): 3990; (34): 1333, Brodo 16318, Macoun 373.

***Usnea subfloridana* Stirton**

Rare; on trees. (27): Macoun 374; (31): 1827, 3827.

***Verrucaria aethiobola* Wahlenb. *in* Ach.**

Rare; on calcareous rock, at edge of water. (25): 4446, 4451; (29): 4248.

***Verrucaria calciseda* DC.**

Frequent; on calcareous rocks in forests or in the open. (13), (25), (27), (28), (29), (31), (32), (34).

***Verrucaria calkinsiana* Servít**

Common; on calcareous rocks in forests or, more often, in open fields. (10), (12), (13), (15), (18), (25), (27), (28), (31), (33), (34), (36). This species may sometimes be confused with *V. muralis*. It differs from the latter species in having a greenish to brownish or whitish grey thallus instead of a white thallus. In addition, *V. calkinsiana* has a black excipulum fused to the involucrellum, whereas in *V. muralis*, the excipulum appears hyaline and distinct from the involucrellum.

***Verrucaria funckii* (Sprengel) Zahlbr.**

Very rare; on a submerged limestone bank along stream. (27): Brodo 9710.

***Verrucaria fuscella* (Turn.) Winch**

Common; on calcareous rocks, or less frequently on granitic boulders, usually in shaded situations. (10), (12), (13), (17), (19), (25), (27), (28), (29), (31), (33), (34).

***Verrucaria glaucovirens* Grumm.**

Frequent; on calcareous or non-calcareous rocks. (10): 2728; (13): 2086; (17): 2767; (27): 4340; (28): 2360; (33): 3457.

***Verrucaria muralis* Ach.**

Common; on calcareous rocks, usually in the open. (3), (4), (9), (10), (12), (13), (19), (27), (28), (30), (31), (33), (34). The relationship between this species and *V. calkinsiana* has already been discussed.

***Verrucaria nigrescens* Pers.**

Common; on calcareous or non-calcareous rocks, usually in the open. (10), (13), (17), (19), (27), (28), (29), (31), (33), (34).

***Verrucaria nigrescentoidea* Fink**

Frequent; on calcareous or non-calcareous rocks, in shaded situations. (12): 2757; (13): 2232; (19): 2572; (30): 2535; (31): 4078, 4113; (33): 462, 3487; (34): Brodo 7514.

***Verrucaria* sp. #1**

Rare; on calcareous rocks, in the open or in forests. (13): 2113, 2114, 2119; (30): 2890; (34): 1353. This species is often growing alongside *V. muralis*. It differs from the latter species in having a brown or greenish brown thallus which is thin, chinky-areolate, and becoming granular. The perithecia (0.3-0.4 mm broad) are partially immersed in the thallus. Its exciple and involucrellum are both black, with the involucrellum extending downward to the base of the exciple and wrapping around it in part. The spores are non-septate, later become 1-septate, 16-19.5 x 7.5-9 μm.

***Verrucaria* sp. #2**

Very rare; on a granitic outcrop. (30): 2530. This specimen is very distinctive due to its rather thick, continuous to partly rimose, greenish brown to dark brown thallus. The perithecia are in hemispherical raised bumps on the thallus. The excipulum is brown and the involucrellum extends downward and spreads laterally into the thallus. The spores are unusually large, 25-32(-38) x 10-13.5 μm.

***Xanthoparmelia conspersa* (Ehrh. *ex* Ach.) Hale**

Infrequent; on granitic boulders or, in one case, on birch; in the open. (25): 3691; (27): 2225, 2266, Brodo 27595; (30): 2891, 2906; (31): 1844C, 2970, 3866, 4196; (33): 212, 246, 3355, 3479.

***Xanthoparmelia cumberlandia* (Gyelnik) Hale**

Very common on granitic boulders or, in one case, on a fence post; in open or in shaded situations. (9), (12), (13), (14), (17), (20), (23), (25), (26), (27), (28), (29), (30), (31), (33), (34), (36). This species bears an external resemblance to *X. somloënsis* which, however, contains salazinic instead of stictic and norstictic acids and seems to be restricted to the exposed habitats. *Xanthoparmelia cumberlandia* is found in both exposed to very shaded situations. This is the most common species of the genus in southern Ontario.

***Xanthoparmelia plittii* (Gyelnik) Hale**

Frequent; on non-calcareous rocks or, in one case, on *Juniperus* wood; in open or partially shaded areas. (25): 3692, 3742; (27): 2252; (29): 2507; (32): Brodo 14573; (33): 434, 474, 2323, 3331, 3336, 3420, 3471; (34): 2793, 2811B, 2826.

***Xanthoparmelia somloënsis* (Gyelnik) Hale *in* Ahti, Brodo & Noble**

Common; on granitic boulders rocks, in open. (22), (25), (27), (29), (30), (31), (32), (33), (34). The relationship between this species and *X. cumberlandia* has been discussed.

***Xanthoria elegans* (Link) Th. Fr.** (See key to *Caloplaca*.)

Common; on rocks, often on calcareous rocks, more often on enriched bird-perch rocks, usually in exposed areas, more often on lake shore. (4), (13), (14), (15), (16), (22), (23), (25), (27), (29), (31), (33). We are tentatively classifying *X. elegans* and *X. sorediata* in accordance with Egan (1987), but recent evidence based on their fungal parasites (Hafellner 1990, as presented orally) indicates that they are better classified in the genus *Caloplaca*, despite the presence of a lower cortex on many specimens. The lobate *Caloplacae* are now undergoing study in Sweden (Arup, in litt), and so we will refrain from making the change until those studies have been completed.

***Xanthoria fallax* (Hepp *in* Arn.) Arn.**

Very common; on bark of various trees, or fence rails in open areas, especially along roadsides; rarely in forests. (1), (3), (4), (5), (6), (9), (12), (14), (15), (16), (17), (20), (22), (27), (30), (33), (34), (36). This is the species that gives the bright orange colour to roadside trees in southern Ontario. Growing with it would be *Physcia adscendens*, *P. millegrana* and *Physconia detersa*.

***Xanthoria polycarpa* (Hoffm.) Rieber**

Frequent; on bark of various trees, most often on poplar. (5): Millman 450; (15): 3570; (16): Cain 22622 (TRTC), White 314; (25): 3164; (31): 1817, 3886, 4135; (34): Macoun 5, 36, 236, Shchepanek 129.

******Xanthoria sorediata* (Vainio) Poelt** (See key to *Caloplaca*.)

Rare; on calcareous rocks. (13): Williams 2520; (27): 4336B, 4340. See comments under *X. elegans*.

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